

HAZMAT tornado spills

derailment terrorism

hurricane toxins crisis

radiological flood fire biological nuclear response

catastrophe hazard pollution WMDs explosive contamination

containment chemicals incident barrier disaster capability surge

oversight risk Superfund operations

lightering salvage safety OPA

ricin support teams

collision Ebola assistance deployment

coordination threat sheen emergency oil

FOSC earthquake substance resources

training grounding 9/11 shipwreck consequence contingency

divers discharge boom exercises skimmers flammable release

exposure decontamination DWH augment dracones sampling

planning strategies radiation pumps monitoring interoperable

equipment challenges anthrax Special Chemical of the Quarter

Old Weapons Affect Modern Mariners

poisonous preparedness environmental slick SMART explosive

pollutant hazardous contain oversee toxic OSC respond

The COAST GUARD Journal of Safety
& Security at Sea

PROCEEDINGS

of the Marine Safety & Security Council

Spring 2015

National Strike Force

■ *Any time*

assistance deployment

■ *Any place*

sheen emergency oil

■ *Any hazard*

substance resources

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Assistant Commandant's Perspective

by REAR ADMIRAL PETER J. BROWN
U.S. Coast Guard
Assistant Commandant for Response Policy

We devote this issue of *Proceedings* to those who assume, as their core mission, responsibility for all-hazards response. Skillfully preparing for and responding to disasters of all kinds—from oil spills and hazardous material releases to mass casualties—requires a diverse, robust, engaged, and proficient team. Those who comprise our National Response System are proactive in thinking strategically, initiating informed policy, honing and applying intelligent on-the-ground tactics, training continually, stocking and maintaining essential specialized equipment, operating in interagency and international environments, drafting and preserving careful documentation, and much more, all while carefully navigating complicated legal, fiscal, political, and public-relations realities.

As I write, we are deploying members of the Pacific Strike Team to Bangladesh to assist authorities there in responding to a significant heavy fuel oil spill impacting the Sundarbans, a site renowned for its remarkable biodiversity, which is now endangered. This, unfortunately, is not an exceptional case. It merely serves as one example of how we deploy National Strike Force personnel on a regular basis. Each strike team member averages 160 deployment days per year, in support of national and international crisis response operations. In another case, we detailed an industrial hygienist to the DHS Office of Health Affairs to assist with the Ebola outbreak. These deployments require an enormous amount of collaboration and coordination, and are vitally important to cultivating and sustaining a healthy National Response System that is critical to ensuring national security and our collective economic well-being.

Certain emerging realities highlight the demand for our all-hazards capabilities and the criticality of preparing for and executing all-hazards response operations. The contemporary boom in North American crude oil and natural gas production, for example, will stress marine transportation systems already faced with aging infrastructure, minimal recapitalization, and a general lack of investment. With increased vessel traffic and congestion on our waterways, we must anticipate some increase in discharges, spills, groundings, and other accidents. Swelling populations, typically densely clustered along coastal shorelines, are especially vulnerable to severe weather. Hurricanes, typhoons, tsunamis, and other disastrous natural events devastate communities, bring about catastrophic loss of life, and damage key infrastructure. International political tensions can spark armed conflict, increasingly asymmetric and unconventional in nature, as well as violence by terrorist organizations or lone actors; nefarious intent carries with it potential use of chemical, biological, radiological, nuclear, and explosive devices. The aforementioned challenges represent the proverbial tip of the iceberg to which those who make up the National Response System—operators and support staff alike—devote their time and attention in full. Our service motto of *Semper Paratus* resonates across the full spectrum of potential events.

To this end, and at the direction of the Commandant, the Deputy Commandant for Operations and U.S. Coast Guard headquarters staff are diligently working on a Climate Change Strategy and an Energy Renaissance Action Plan. These documents will complement existing guidance, such as the Western Hemisphere Strategy, and provide important direction and prioritization for programmatic and field-level response efforts.

This issue of *Proceedings* provides an in-depth understanding of the historical accomplishments, current challenges, and future work in the dynamic world of incident management and crisis response. I strongly encourage you to take away from this insightful and intriguing issue an understanding that the safety and security of our citizenry, environment, and economy depend upon, at least in part, the comprehensive initiatives of interagency, Department of Homeland Security, and U.S. Coast Guard national responders.

Champion's Point of View



by CAPT CLAUDIA C. GELZER
*U.S. Coast Guard
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Picture the following scenarios: 1) two vessels collide on the Houston Ship Channel and thick bunker fuel gushes into the busy waterway; 2) train cars derail, release toxic chemicals into Mantua Creek in New Jersey, and residents are exposed; 3) a Category 5 hurricane ruptures a million-gallon oil storage tank, its noxious contents spill into flood waters that surge into New Orleans neighborhoods; 4) the Department of Defense seeks subject matter expertise to destroy Syria's 620-ton chemical weapons stockpile in a complex offshore operation.

Sweating a bit? Or are you chomping at the bit to get to work? If it's the latter, you're probably a Coast Guard strike team member. These were real all-hazard response scenarios Coast Guard operational commanders faced. While each required a unique response, they all had one thing in common: the National Strike Force (NSF) deployed to ensure a successful outcome. For more than four decades, these highly trained and specialized teams have responded in the name of public and environmental safety to make bad scenarios better.

I'm proud to honor the history of our NSF through this edition of *Proceedings*. This issue will provide a better understanding of a capability that allows federal on-scene coordinators—both Coast Guard and EPA—to sleep easier at night. A national asset and “special team” codified in the National Contingency Plan, the National Strike Force is highly adaptive and ready to respond. It is comprised of three all-hazard response teams under the NSF Coordination Center, covering the U.S. and its territories, and providing technical expertise to international partners worldwide.

The NSF was an essential force multiplier when the Coast Guard responded to the largest marine oil spill in U.S. history. *Deepwater Horizon* was a watershed event for our service. It tested our capabilities, challenged our policies, and reminded us that we must always work to develop more effective response techniques and planning scenarios. In the five years since the spill, the Coast Guard has applied many vital lessons learned to strengthen our people, equipment, and policy.

We developed formal FOSC training, created district incident management preparedness advisors, and established a deployable Incident Management Assistance Team. We strengthened interagency partnerships, fortified the spill of national significance exercise program, and invested in pollution response research and development. This year, the field will receive a major program policy update—the new Marine Environmental Response Manual—to replace MSM Volume IX. Perhaps most exciting, the Coast Guard recently welcomed the very first marine safety specialist response warrant officers into our ranks to bolster field expertise.

The National Strike Force's role remains at the core of the Coast Guard's marine environmental response capability, which will undoubtedly continue to be tested as industry drills offshore in deeper, more remote waters, including in the Arctic; as we experience unprecedented domestic oil production; and as we experience the effects of climate change and extreme weather events. The NSF's contribution will perhaps be most vital during “peacetime”—the calm between spills and crises—when we can focus on preparedness, planning, and exercises.

Congratulations to the authors who contributed to this historic edition of *Proceedings*. Thank you to all who serve and have served as environmental stewards to our nation. This issue is for you!

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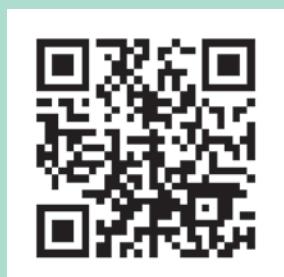
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Today's National Strike Force

National Strike Force all-hazard response capabilities.

by LT SCOTT HOULE
Operations Officer
U.S. Coast Guard Gulf Strike Team

BM1 KENNY TUCKER
U.S. Coast Guard Gulf Strike Team

The National Strike Force (NSF), established in 1973 to combat large oil spills in support of the federal on-scene coordinator (FOSC), has transformed during the last 40 years into a robust, worldwide, all-hazard response organization.

Comprised of the Gulf Strike Team, the Pacific Strike Team, the Atlantic Strike Team, and the National Strike Force Coordination Center, the NSF plans for and responds to:

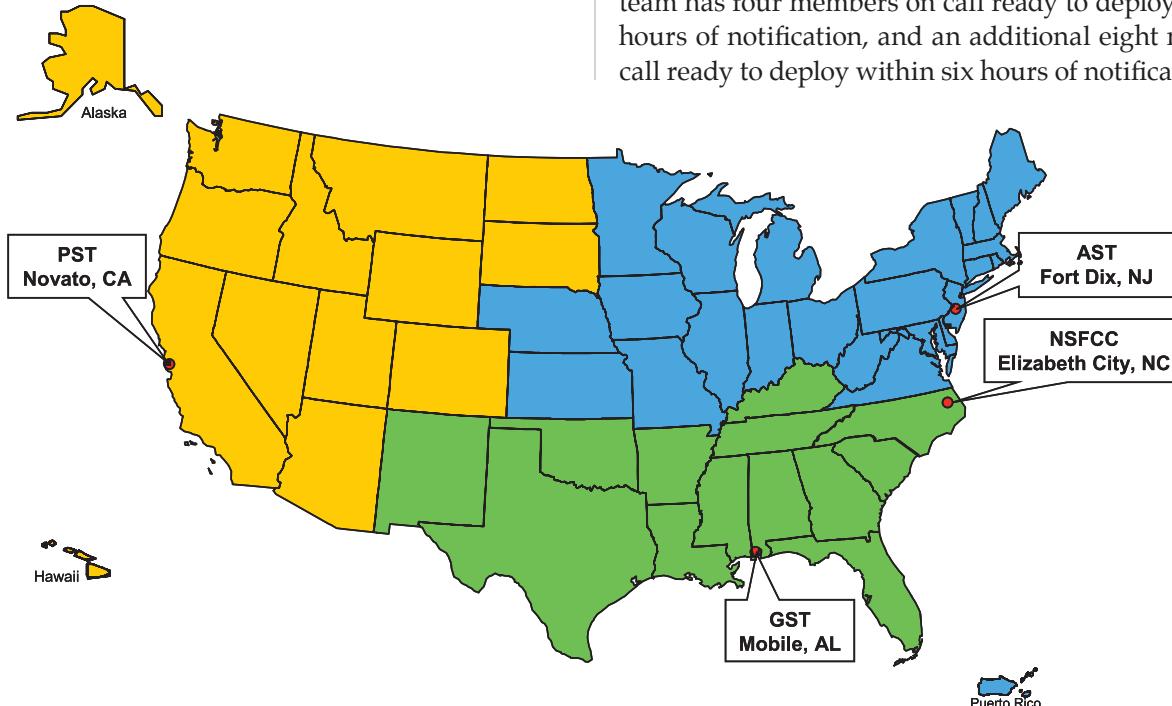
- major oil spills;
- hazardous material (hazmat) releases;
- vessel lightering and salvage;
- natural disasters;
- weapons of mass destruction and other chemical, biological, and radiological events.

The U.S. Department of State coordinates all international support, which, in many cases, is predetermined and outlined in existing international agreements between the U.S. and other countries.

Personnel

The NSF currently boasts more than 200 hazmat technicians who are qualified in specialized response techniques, site safety, hazard mitigation and source control, incident management and command and control support, cost management, and photo documentation.

The strike force maintains three 12-person hazmat teams at all times—one at each strike team location—ready to deploy in response to any request for assistance. Each 12-person team has four members on call ready to deploy within two hours of notification, and an additional eight members on call ready to deploy within six hours of notification with all



The National Strike Force

Plug and Play

The National Strike Force prides itself on being completely interoperable—meaning any NSF strike team member is able to seamlessly integrate with personnel from the other strike teams, regardless of which team the other personnel came from.

Moreover, the strike force works toward interoperability with other specialized response teams from other government agencies and non-governmental organizations through joint exercises and training sessions, to refine interoperability and share and enhance each other's best practices and policies.

Going the Distance

The NSF's 12-person hazmat response teams are each capable of rapid deployment with equipment that allows them to operate 24 hours a day in up to Level A personal protective equipment (fully encapsulated, vapor-tight protection). This allows the team to make continuous entries into a contaminated area for at least 72 hours, before they need to restock specialized protective gear or personnel.

This is a significant advantage for incidents in remote locations and those that require complex efforts to secure a contamination source or to minimize human health or environmental impact.

Tailored Response

All NSF hazmat technicians are proficient in chemical response operations. Additionally, the teams maintain many types of response packages.

Each is comprised of slightly different equipment, but all are ready for quick deployment. This allows teams to be very nimble in their response and deployment tactics and to quickly tailor a package to the response, as every incident is unique and requires slightly different equipment.

Fighting Brain Drain

Due to the rapid increase of oil production throughout the United States, there is a clear demand for experienced oil spill response personnel. In the post-*Deepwater Horizon* era, the response community is faced with the inevitable loss of experienced personnel—those who responded to the *Exxon Valdez* oil spill in

1989. These responders, who were then in their 30s, have since gathered 25 years of experience and are approaching retirement age. It is and continues to be a challenge to replace responders with this level of knowledge and real-world experience.

In an effort to enhance their experience and competency, NSF personnel consistently respond to oil-related incidents, participate in exercises, and conduct training sessions year-round and throughout the world.

SMART

The National Strike Force also implements and monitors special oil spill response tactics, also known as "specialized monitoring of applied response technologies" or SMART, which rely on small, highly mobile teams that collect real-time data during dispersant and *in-situ* burning operations.

This information is channeled to the unified command and allows leaders to make appropriate response decisions.

required equipment. The remainder of the team maintains a 24-hour response posture.

The Gulf Strike Team is located in Mobile, Alabama; the Pacific Strike Team in Novato, California; and the Atlantic Strike Team in Fort Dix in New Jersey.

The National Strike Force Coordination Center is located in Elizabeth City, North Carolina.

Members typically deploy for up to 21 days. If an incident exceeds this period, additional responders will be deployed to backfill positions. National Strike Force responders deploy, on average, 160 days per year.

NSF personnel are experts in site safety planning and oversight and are frequently requested to serve as Incident Command System (ICS) safety officers for hazmat response operations. As such, they are familiar with Occupational Safety and Health Administration requirements for hazardous waste operations and emergency response and have

specific training in hazard analysis techniques. National Strike Force personnel are also certified to serve in a wide range of ICS positions, including incident commander, operations section chief, planning chief, safety officer, and finance and logistics section chief, or as deputies or coaches for those positions.

As hazmat technicians, NSF personnel are subject matter experts in hazard mitigation and source control; and, although technicians are trained and ready to suit up in personal protective equipment (PPE)¹ to go in and physically perform source control, they are more often requested to provide advice and help develop strategies.

Response Services

Biological response services: The National Strike Force maintains the equipment and capability to conduct site assessment and characterization for incidents with suspected biological warfare agents. Personnel use specialized equipment to make field presumptive determinations to identify if a biological agent exists at the incident and then make recommendations to the FOSC based on the results.



Specialized Equipment

Personal Protective Equipment

The National Strike Force maintains a robust cache of specialized personal protective equipment to allow responders to safely perform work in hazardous environments, including levels A, B, C, and D personal protective equipment (Level A being the most protective).

Robot

Each strike team also has a mini Andros robot that can transport hazmat sensors into a hazardous environment. It also serves as a great remote-observation instrument, as it is equipped with three onboard video cameras.

Hazmat Response Trailer

Carrying everything needed to conduct continuous entries into a hazardous environment, the hazardous material response trailer comes complete with a mobile incident command center, robust communications suite, onboard generators, and an air compressor system to refill self-contained breathing apparatus air bottles.

Re-Breather

A re-breather is a breathing apparatus that recycles the substantially unused oxygen content of each breath, which allows responders to remain in a hazardous environment in excess of four hours—much longer than responders wearing self-contained breathing apparatus. Re-breather technology promises to become the future of respiratory protection for NSF responders.

Monitoring Equipment

Strike force members use detection and monitoring equipment—such as organic vapor-detection instruments, multi-gas meters for toxic and explosive atmospheres, networked remote atmospheric monitors, and aerosol particulate meters—to identify unknown atmospheres and quantify contamination.

The NSF also constantly evaluates new technology and advanced instruments that are emerging for emergency response. This ensures that older, less capable, or more bulky equipment is replaced by equipment that offers more compact, robust technology.

Mobile Incident Command

Trailer

One of the NSF's most recent additions to its specialized equipment collection is an updated mobile incident command post, which replaces mobile incident command posts that the Department of Defense transferred to the National Strike Force in 1997.

The trailer is self-contained, complete with generator power, climate control, and an extensive wireless communications system that allows NSF responders to leverage advanced communications, video, and geographic information systems technology for efficient and effective response.

Radiation Detection Tools

NSF personnel use a variety of instruments to detect, identify, and measure



MST1 Spencer Ehlers carries NSF Level 2 radiation detection equipment. U.S. Coast Guard photo by MST2 Heather Clark.

radiation, for example, thermo luminescent dosimeters to ensure response personnel don't exceed their annual dose limit for ionizing radiation.

Oil Spill Response Equipment

NSF oil spill response equipment includes the vessel of opportunity skimming system, inflatable open water containment boom, and temporary storage devices.

Small Boats

The Coast Guard 26-foot trailerable aids to navigation boat provides the NSF a versatile platform from which to perform multiple missions. Its removable buoy door allows waterline diver deployment and recovery for a smooth transition and assists with diver fatigue.

Shallow draft, 18-foot aluminum hull center console vessels allow NSF responders to deploy on rivers, lakes, and bays that may have shallow water concerns. Responders also use 12-14 foot aluminum flat-bottom jon boats for floodwater operations and where restricted access situations call for small boat operations.

Pumps

NSF personnel use oil and chemical pumping equipment to pump a wide range of chemicals, such as highly corrosive acids, toxic materials, and other dangerous industrial chemicals. The NSF pumping equipment was even used to de-water flooded tunnels in New York and New Jersey, following Hurricane Sandy.

The NSF's pumping equipment is especially useful for transferring product from damaged storage containers or vessels through a process referred to as an "over-the-top" transfer.

Vehicles

The strike team's cache of all-terrain vehicles allows personnel to deploy with the proper PPE and other equipment.

Chemical response services: These are among the most complex and robust of all NSF capabilities. From the first month responders report to a strike team, they are immersed in training and real-world exercises to ensure

they are ready to respond to even the most dangerous toxic industrial chemical, toxic industrial material, or chemical warfare agent.



MSTC Bo Lisenby is wearing Level A (the highest level) personal protective equipment with air monitoring equipment. U.S. Coast Guard photo by MST2 Heather Clark.

Level A, B, C, and D Personal Protective Equipment

Level A protection is required when the greatest potential for exposure to hazards exists and when the greatest level of skin, respiratory, and eye protection is required.

Level B is worn when the same level of respiratory protection is required as in Level A, but a lesser degree of skin protection is needed. Level B protective clothing includes a one-piece ensemble with the self-contained breathing apparatus worn outside the garment. Separate gloves and boots are sealed at the interfaces to minimize chemical penetration.

Level C has the same level of skin protection as Level B, but a lower level of respiratory protection. One- or two-piece splash suits are worn with a cartridge respirator. Used with chemicals that are not hazardous via skin absorption and are typically well below established exposure limits. Level C is required when the concentration and type of airborne substances are known and meet the criteria for using air-purifying respirators.

Level D is the minimum protection required. Protection is primarily a work uniform.



MSTC Bo Lisenby, in Level C PPE, carries a radiation detector. U.S. Coast Guard photo by MST2 Heather Clark.

Oil spill response services: NSF personnel provide specialized oil spill response experience and specialty knowledge, so responders typically seek them out for validation, consultation, and to share techniques associated with oil-related incidents. Additionally, strike force oil response equipment can be deployed anywhere in the world to assist in any response.

Radiological response services: Strike force personnel detect and identify radiation sources and understand Alpha, Beta, Gamma, and neutron radiation. NSF responders typically make initial recommendations and may escalate a response to a special team that specializes in just radiological response.

The National Strike Force Coordination Center

The center oversees the three strike teams and the oil spill response organization classification program. Companies that participate in this voluntary program are subject to a stringent verification program and receive appropriate NSFCC response classifications.

The coordination center also maintains a national logistics database—the response resource inventory.²

40-Year Reflection

The National Strike Force has transformed significantly, from an organization constructed solely to support FOSCs in response to oil spills into an all-hazard response

organization, capable of responding to anything from natural disasters to weapons of mass destruction and terrorist events.

NSF responders have risen to the challenge on numerous occasions, learning new response procedures, tactics, and overcoming significant challenges such as an increase in missions without additional personnel or funding to help with most of the new responsibilities. Although we have the specialized equipment to provide our advertised response capabilities, because of the NSF's professionalism, commitment to the mission, public service, and specialized training, NSF personnel remain its greatest assets.

About the authors:

LT Scott Houle has served in many capacities in the U.S. Coast Guard for 23 years, including two tours in the Gulf Strike Team Operations Department.

BM1 Kenny Tucker has served in many capacities in the U.S. Coast Guard for 13 years, including the Gulf Strike Team Deck and Training Departments.

Endnotes:

¹ See https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9767.

² The Response Resource Inventory, expanded in 1995 to accommodate the needs of the Oil Spill Removal Organization Classification initiative, includes data from companies that wish to have their equipment listed in a publicly accessible system, as well as data generated from the Oil Spill Response Organization classification program. Private industry participation is voluntary, except for when they apply for classified OSROs. See <https://cgrri.uscg.mil/logon.aspx?ReturnUrl=%2fdefault.aspx>.

The National Strike Force and the National Response System

Origins and evolution.

by MR. SCOTT R. LUNDGREN
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U.S. Coast Guard Office of Marine Environmental Response Policy

The multi-layered National Response System (NRS) has undergone several generational advances to ensure effective oil and hazardous substance spill preparedness and response. The core of the NRS, the National Oil and Hazardous Substances Pollution Contingency Plan, or NCP, establishes the roles and mechanisms whereby federal resources and expertise are brought in to assist responses that exceed the capability of local, state, tribal, or territorial responders.

Specifically, NCP elements support the federal on-scene coordinator (FOSC),¹ through National Response Center notification, interagency plan development, and assistance from specialized teams such as the National Strike Force.

Preparedness

In addition to providing environmental response doctrine, the National Response System “family of plans” ensures key stakeholders across the system are participants in the planning documents that apply to their role and that participants establish response strategies and relationships in advance.

At the national level, the 15 National Response Team member departments and agencies² provide input to the Environmental Protection Agency and issue NRS guidance. Regional response teams in 13 regions around the country maintain regional contingency plans consistent with the NCP. At the local level, federal on-scene coordinators chair

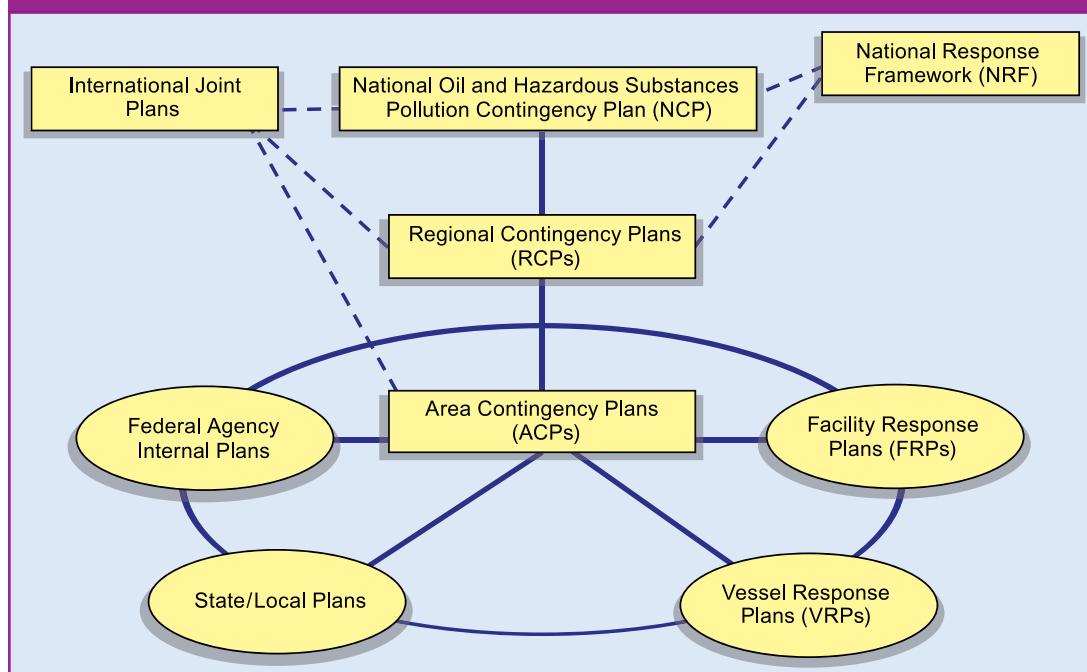
area committees that write area contingency plans, which capture the tactical level of response preparations.

The system also guides the relationships with state emergency response commissions and local emergency planning committees to ensure that community level hazardous substance plans are related to the wider NRS family of plans.

Response

The system begins with National Response Center (NRC) activation. The organization responsible for a discharge of oil or release of hazardous substances

The National Response System Family of Plans



U.S. Coast Guard graphic.



History and Evolution

Torrey Canyon, Cuyahoga River Fire

The massive oil discharge from the *Torrey Canyon* in U.K. waters, in March 1967, prompted questions on preparedness for such a response in the U.S., resulting in the National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan, a predecessor of the National Contingency Plan.¹ With public sentiment galvanized by the growing environmental movement and events, such as the Cuyahoga River Fire of 1969 (started by a spark falling on oil-slicked debris),² Congress passed the Water Quality Improvement Act of 1970. This expanded the 1948 Federal Water Pollution Control Act and called for establishing a strike force to provide necessary services.³

The executive order that assigned responsibilities also provided clear

authority for the Environmental Protection Agency and the Coast Guard to form necessary teams under the Federal Water Pollution Control Act, and so Coast Guard leadership created the National Strike Force in 1973.⁴

Love Canal/Valley of the Drums

Due to public and political attention regarding unmitigated toxic waste sites such as Love Canal in Niagara Falls, New York, and the Valley of the Drums near Louisville, Kentucky, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), colloquially known as "Superfund," which broadened the set of hazardous substances for reporting and removal, established private liability for removal and remediation, and provided for federal removal authority for all affected environments, not just navigable waters. CERCLA also

authorized expenditure of Superfund resources for overhead and equipment for federal strike teams.⁵

Exxon Valdez

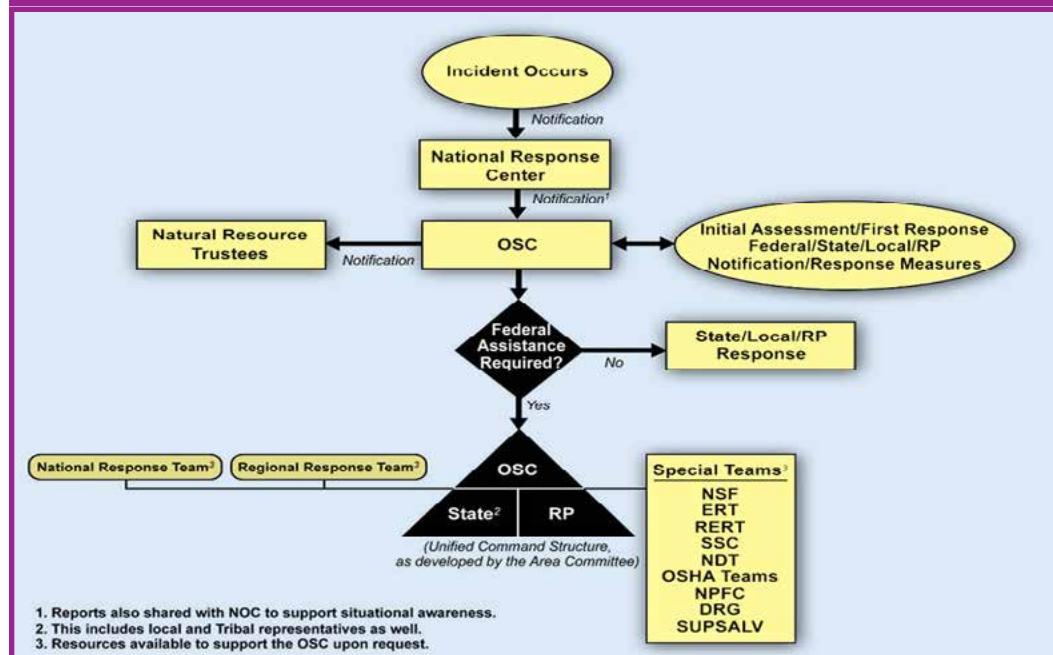
In 1989 the *Exxon Valdez* discharged an estimated 11 million gallons of oil in Alaska's Prince William Sound, triggering the next major National Oil and Hazardous Substance Pollution Contingency Plan evolution, including developing industry response capability. The NSF shifted from Atlantic and Pacific Area strike teams to a footprint of three: Pacific (Novato, California); Gulf (Mobile, Alabama); and Atlantic (Fort Dix, New Jersey). Coast Guard leaders also created the National Strike Force Coordination Center in Elizabeth City, North Carolina, to administer the strike teams and maintain national equipment inventory.⁶

continued on page 12

must by law report these to the NRC. Then the National Response Center, which handles approximately 30,000 spill notifications per year,³ notifies the FOSC, who then contacts national resource trustees and other key response partners and provides an incident assessment.

For many notifications, the FOSC's initial assessment determines that the first lines of response (including the company responsible for the spill and local fire, police, and emergency management organizations) are working effectively, and on-scene federal involvement is not required. If federal assistance is required, the FOSC initiates or joins a

The National Response System Activation, Assessment, and Response.



The National Oil and Hazardous Substance Contingency Plan, 40 CFR 300.105.



In the years after this revitalization, the National Strike Force was also integral to the Coast Guard and the environmental response community adopting and integrating the Incident Command System.⁷

9/11, Anthrax

The National Strike Force was extensively engaged in the 9/11 terrorist attack response, as well as the Capitol Hill anthrax cleanup. The NSF provided tactical entry teams, specialized equipment, management support, and a

deputy incident commander for the anthrax response emergency phase.⁸

During this period, leadership integrated NSF into the Coast Guard Deployable Operations Group and operations included greater integration with security and defense forces, more involvement in special security events, and enhanced chemical, biological, radiological, and nuclear capabilities.

On the national stage, the NCP played an integral part in the post-9/11 National Response Plan, later being integrated as an operational supplement to the successor National Response Framework. The Incident Command System, long used by environmental responders, became the incident management system of choice and national policy under Homeland Security Presidential Directive-5.⁹

Hurricane Katrina

The National Strike Force deployed to the Hurricane Katrina response to support field commanders, and assumed the Coast Guard aspect of the oil and hazardous substance mission, in



Members of the U.S. Coast Guard Atlantic Strike Team decontaminate investigators during the Capitol Hill anthrax cleanup. U.S. Coast Guard photo.

command structure that follows the Incident Command System model of the National Incident Management System, and uses a unified command at the leadership level to ensure that there are common incident objectives and approaches.⁴

Further, the FOSC and the unified command may draw on agency resources or regional and national response teams, as well as National Response System special teams (including the National Strike Force) that provide deployable, adaptable, and scalable specialized capability.

The Future

Certain events have tested system limits and have resulted in statutory and regulatory improvements (see sidebar). Looking forward, the burgeoning North American energy and petrochemical trends that have emerged during the past five years have fundamentally changed oil production and transportation patterns so that a larger number of smaller vessels will spend more time on or near U.S. waters.

Reduced energy and feedstock costs also are renewing the domestic chemical industry, which brings an attendant rise in risk.

These and other changes necessitate planning and preparedness review to ensure we as a nation are ready to respond. Fortunately, the National Response System and the National Strike Force adapt to address challenges and work to protect human health and the environment.

About the author:

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support of the Coast Guard incident commander.¹⁰

This event prompted national leaders to replace the National Response Plan with the National Response Framework, which provided more opportunities to utilize the NSF as a key element for environmental response during a disaster or emergency.

Deepwater Horizon

The massive discharge from the Macondo well into the Gulf of Mexico was the first oil spill since the *Exxon Valdez* to demonstrate the challenges and pressures of a spill of national significance. The NSF played a key role in the response and applied specialized removal techniques during this highly complex environmental incident.¹¹

Following this response, the Coast Guard created the Coast Guard Incident Management Assistance Team (CG-IMAT) with an all-hazards incident management focus. The CG-IMAT also absorbed the Public Information Assist Team (PIAT), previously based at the National Strike Force Coordination

Center, to provide improved all-hazards incident command support.¹²

Nationwide efforts included improving National Response System capabilities and developing an oil/chemical incident annex to the Federal Interagency Operations Plan.

Recent Events

Recent NSF support includes dewatering the Brooklyn-Battery Tunnel, after the devastation of Hurricane Sandy in 2012 to providing specialized overseas support to the Department of Defense.

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2. Kovasity, M. (2013) *Environmental Hazards: The Cuyahoga River Fire*. EnviroMentor. Available at www.asse.org/professionalsafety/docs/MarkKovasityArticle.pdf.
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7. Plourde, CDR K., LCDR Tim Deal, and LT Doug Lincoln (2003). *Changes in the Use of Incident Command System in the U.S. Coast Guard*. International Oil Spill Conference Proceedings, April 2003, Vol. 2003, No. 1. Available at <http://dx.doi.org/10.7901/2169-3358-2003-1-1175>.
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9. HSPD-5 is available at <http://fas.org/irp/offdocs/nspd/hspd-5.html>.
10. Cantin, R., Roger Laferriere, Larry Hewett, and Charlie Henry. *Managing Multiple Oil Spills from a Natural Disaster: The Katrina Oil Spill Responses*. International Oil Spill Conference Proceedings, Vol. 2008, No. 1, May 2008.
11. On Scene Coordinator Report, *Deepwater Horizon Oil Spill*, submitted to the NRT, September 2011. Available at www.uscg.mil/foia/docs/dwh/fosc_dwh_report.pdf.
12. CG-IMAT unit information sheet. Available at www.uscg.mil/lantarea/cgimat/.

Endnotes:

1. While the NCP uses the term on-scene coordinator, the Coast Guard preference used in this document is federal on-scene coordinator to differentiate between the on-scene commander in the search and rescue mission.
2. The 15 agencies are: the Environmental Protection Agency (NRT Chair); the U.S. Coast Guard (NRT Vice Chair); the Department of State; the Federal Emergency Management Agency; the Department of Agriculture; the Department of Labor; the Department of the Interior; the Department of Defense; the Department of Justice; the Department of Health and Human Services; the Nuclear Regulatory Commission; the Department of Energy; the Department of Commerce; the General Services Administration; and the Department of Transportation.

3. National Response Center annual data reports are available at: <http://cgmix.uscg.mil/NRC/>.

4. See 40 CFR 300.305, or visit online at www.fema.gov/national-incident-management-system.

For more information:

To report oil or pollution spills,
call the National Response Center
at (800) 424-8802.



From Oil to Anthrax

The National Strike Force's long, messy history.

by CDR KEITH M. DONOHUE

*Commanding Officer
Pacific Strike Team*

Since its inception in the early 1970s, the National Strike Force (NSF) has provided support for thousands of incidents throughout the world. It has evolved and continues to be a relevant and effective special team for U.S. Coast Guard federal on-scene coordinators (FOSCs), Environmental Protection Agency (EPA) on-scene coordinators (OSCs), as well as a deployable specialized force for all federal incident commanders during all-hazard responses.

Today's National Strike Force draws on decades of experience, from the U.S. government's actions to address oil spills in the 1970s, to hazardous material releases of the 1980s, incident management emergence in the 1990s, and today's weapons of mass destruction and consequence management realities.

Oil Spills of the 1960s and 70s

The Beginning

In March of 1967, the *Torrey Canyon* ran aground in shallow waters off the coast of England. The vessel split, spilling an estimated 119,000 tons of crude oil into the English Channel.¹ As a result, President Lyndon B. Johnson directed the secretaries of the Interior and Transportation to study our ability to respond to such disasters.

The resultant report—Oil Pollution: A Report to the President—concluded that the U.S. was not prepared to deal with a spill of this magnitude. Therefore, President Johnson tasked the secretary of Interior to develop multi-agency contingency plans for federal oil and hazardous materials spill response.

On November 13, 1968, the president approved the National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan (National Contingency Plan), which coordinated federal, state, and local pollution incident response capabilities. The plan provided guidance to develop a system to prevent, discover, report, restrict, clean up, dispose of, and recover the cleanup costs for pollution incidents.

Furthermore, the plan proposed a national "reaction team," identified the responsibilities for each signatory agency,² and named the on-scene commander as the executive agent who would direct pollution response activities. What the plan lacked, though, was statutory authority that specifically authorized agency responsibilities to implement the plan.

Accidents Don't Wait

Then, on January 28, 1969, a gas blowout occurred off the coast of Santa Barbara, California. Although the blowout was sealed off by reinserting the drill pipe back into the well, oil began to seep out of natural faults below the ocean floor where the original blowout occurred. During the next few days, an estimated 30,000 barrels of oil escaped, producing a massive oil slick.³

The Coast Guard commander of Group Santa Barbara, designated as the on-scene commander, used the National Contingency Plan for the first time to coordinate local, state, and federal agency response.

Responding to the Santa Barbara incident, President Nixon tapped the director of the Executive Office of the President's Office of Science and Technology to develop a panel to investigate the problem and make recommendations.

At the same time, an avalanche of bills sprang up in Congress. By February 1969, there were a dozen bills concerning oil pollution pending before the House alone. While the House and the Senate were working on the various bills, another series of disasters occurred. A tanker grounded off the coast of Nova Scotia, a drilling platform exploded off New Orleans, and another tanker grounded in Tampa Bay.⁴

In 1970, Congress enacted the National Oil and Hazardous Pollution Contingency Plan (NCP), which superseded the 1968 National Multiagency Oil and Hazardous Material Contingency Plan. The new plan defined the term "hazardous substance" and mandated that strike forces respond to polluting spills.

The First USCG Strike Teams

By 1973, the USCG established three strike teams:

- the Atlantic Strike Team, in Elizabeth City, North Carolina;
- the Gulf Strike Team, in Bay St. Louis, Mississippi;
- the Pacific Strike Team, at Hamilton Air Force Base, Novato, California.

The three strike teams provided communications support, advice, and expertise in ship salvage, diving, and hazardous substance removal techniques.

In the mid 1970s, the National Oceanic and Atmospheric Administration and the EPA stood up additional special forces, known as scientific support coordinators, and the USCG and EPA each established public affairs teams. Each team was available for USCG or EPA on-scene commanders to call upon in need under the authority of the National Oil and Hazardous Pollution Contingency Plan.

The First Tests

Then in December 1976, the vessel *Argo Merchant* ran aground off Nantucket Island, Massachusetts, spilling 7.5 million gallons of oil. Although the spill saw a massive response under the NCP, the size of the spill, combined with the harsh weather conditions, exceeded the technological oil recovery capabilities of the time.⁵

As a result, in March 1977, President Carter recommended specific measures to better control maritime oil pollution, including improved response times and enhanced federal ability to respond to oil pollution emergencies. He also directed the USCG and the EPA to improve their ability to contain and minimize the damaging effects of oil spills. The specific goal was to develop the ability to respond within six hours to a spill of 100,000 tons.

In response, the USCG conducted a series of deployment requirement studies, which led to the prescribed six-hour response standard that today's strike teams still provide. In addition, throughout the 1970s, the strike teams expanded their equipment inventory. For example, personnel developed an air-deliverable anti-pollution transfer system and an open water oil containment system, designed specifically for high seas and strong wind conditions; a fast surface delivery sled for pollution response equipment; and added skimming capability to current methods, which enabled containment and recovery operations to occur simultaneously.

Then, on June 3, 1979, another oil disaster struck, as a blowout occurred at a well in the Gulf of Mexico. For more than a month, between 10,000 and 30,000 barrels of oil per day were



A Coast Guard helicopter prepares to hoist people off the tanker SS *Argo Merchant*, which ran aground off the coast of Nantucket, Massachusetts, December 1976. Photo courtesy of the U.S. Coast Guard Historian's office.

discharged. Although Mexican authorities, the U.S. Coast Guard, and cleanup companies from around the world responded, a huge slick moved toward Texas and ultimately affected its coastline by the end of the summer.⁶

Chemical Releases of the 1980s

The Comprehensive Environmental Response, Compensation, and Liability Act

In response to growing public awareness regarding hazardous waste sites across the country, such as Love Canal in New York, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on Dec. 11, 1980, to help seal the response gap that previously only provided federal mandates and funding to respond to oil and some hazardous material on navigable waters. CERCLA also established a new fund (the Superfund) specifically to finance hazardous materials cleanup efforts.

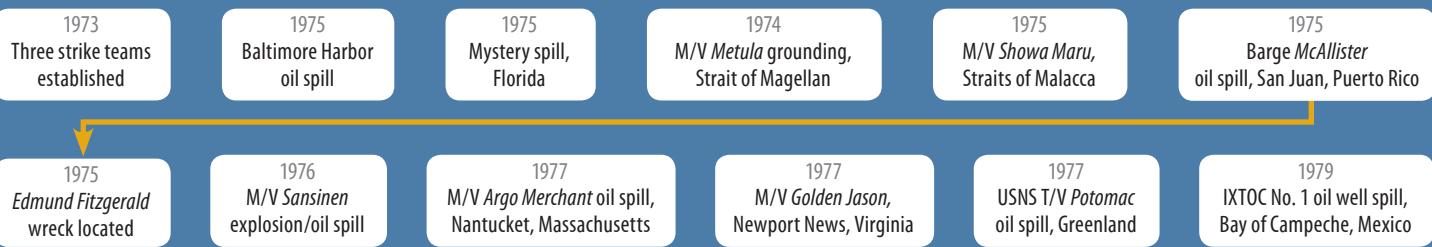
As the United States shifted to a more proactive approach, on Dec. 3, 1984, a chemical release from a pesticide plant in Bhopal, India, killed more than 2,000 people.⁷ Subsequently, the following year, back in the United States, a release of aldicarb oxime occurred at a facility in Institute, West Virginia.⁸ These incidents heightened the need for emergency planning for major accidental chemical releases.

Congress responded, and, on Oct. 17, 1986, passed the Superfund Amendments and Reauthorization Act (SARA) of 1986, which extensively revised existing CERCLA and mandated

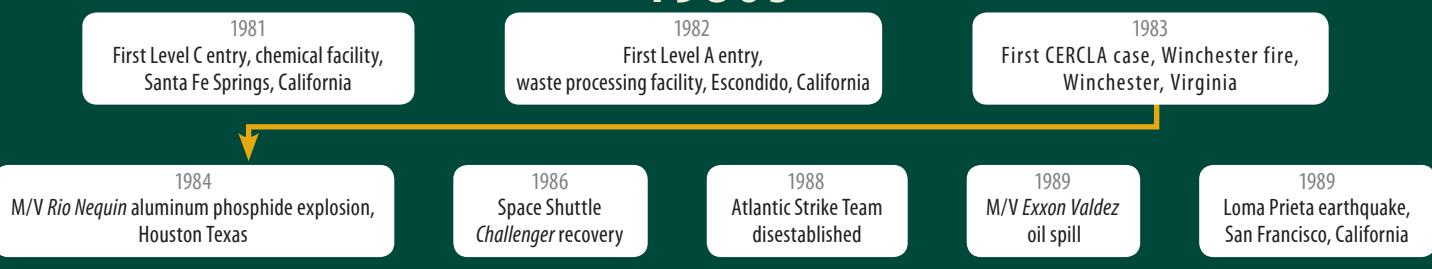


National Strike Force Significant Events

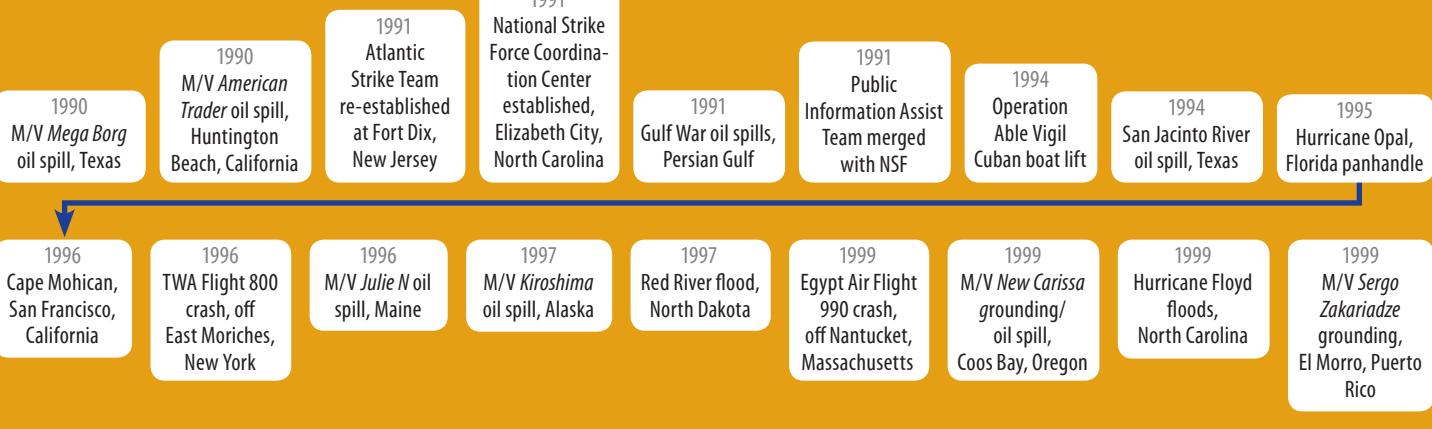
1970s



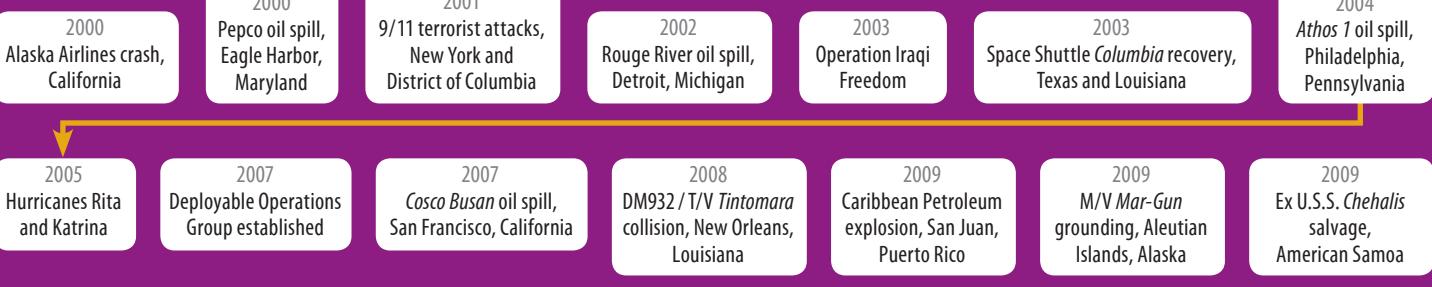
1980s



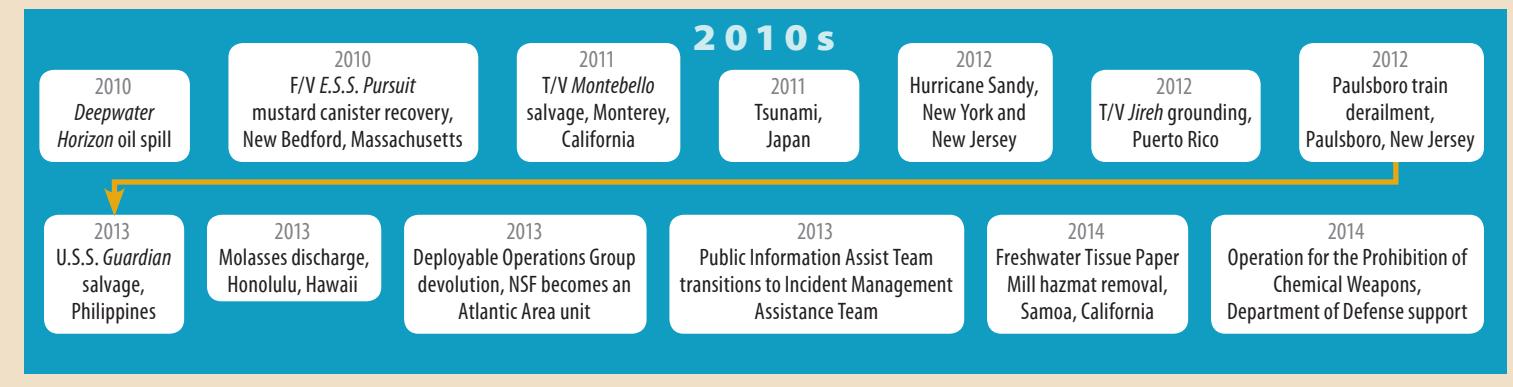
1990s



2000s



National Strike Force Significant Events



that the National Oil and Hazardous Pollution Contingency Plan again be revised.

Additionally, the act required that all releases of hazardous substances be reported to state and local emergency planning officials. SARA also provided mechanisms for citizens and local governments to access hazardous chemical information from facilities in their communities and mandated local emergency planning committees and local emergency response plans.

USCG Response

CERCLA and SARA also significantly increased Coast Guard and EPA OSC responsibilities for response to hazardous substances and established a new realm of response for the special forces. USCG policy established the level of hazardous substance response capability within a USCG FOSC's area of responsibility, based on the risk of chemical release and the availability of commercial, state, local, and other federal response capabilities. Follow-on studies showed that USCG marine safety offices were not adequately staffed or funded to maintain their own response equipment; therefore, they were instructed to utilize the strike teams for hazmat entries as necessary.

To meet the increased tasking, the National Strike Force procured state-of-the-art chemical response equipment and instituted a rigorous hazardous substance training program for all NSF personnel, as, compared to oil spills, hazardous substance release response requires much more caution, technical expertise, and training.

In 1984, the USCG FOSC in Houston, Texas, relied on the NSF when a container full of aluminum phosphide canisters on a vessel exploded—filling the cargo hold with toxic



Workers steam blast rocks soaked in crude oil from the leaking tanker *Exxon Valdez*. U.S. Coast Guard photo.

fumes. Then in 1985, the USCG captain of the port in San Francisco called upon the Pacific Strike Team (PST) when a drum containing insecticide was suspected of leaking inside a container on an inbound ship. The PST—the only resource available to board the ship at sea and make an entry into the hazardous material environments—conducted a hazard assessment and stabilized the container.⁹

Continuing response coordination efforts, the Occupational Safety and Health Administration (OSHA) issued a final rule on June 30, 1993, mandating departments to use the Incident Command System (ICS) for all hazardous materials incidents. This was the first ICS appearance in federal regulation, and it changed the way the NSF did business.

USCG units and the National Strike Force adopted ICS, strike team personnel became ICS instructors, and the ICS spread to the rest of the Coast Guard.

OPA 90

Exxon Valdez

Between 1989 and 1990, several large oil spills created, yet again, new focusing events for the NCP. First, in March 1989, the most notorious oil spill to hit the U.S. occurred when the tank vessel *Exxon Valdez* grounded off the coast of Prince William Sound, Alaska. The spill discharged approximately 11 million gallons of oil and affected approximately 1,300 miles of coastline. The response ultimately involved more than 10,000 workers during a four-year period.¹⁰

In response, after 15 years of unsuccessful attempts to pass similar legislation, the House and Senate unanimously passed the Oil Pollution Act of 1990 (OPA 90), which expanded federal removal authority, added federal on-scene coordinator responsibilities, and broadened coordination and preparedness planning requirements. OPA 90 also directed developing a national planning and response system that would include tank vessel response plans, facility response plans, and area contingency plans—all of which were to be adequate for “worst case” response.

The act required the Coast Guard to establish a national response unit to relieve equipment and personnel shortages and provide spill contingency planning coordination among federal agencies. Specifically, this unit would:

- maintain lists of spill response equipment,
- provide technical assistance,
- coordinate equipment and resources,
- assist in preparing area contingency plans,
- administer the Coast Guard’s strike teams.

Thus, Coast Guard leaders established the National Strike Force Coordination Center (NSFCC) in Elizabeth City, North Carolina. The NSFCC, along with a newly created Coast Guard Public Information Assist Team, and the three Coast Guard strike teams, became the Coast Guard’s new National Strike Force (NSF).

Today's Response Realities

9/11, Anthrax

The terrorist attacks on the World Trade Center and the Pentagon on September 11, 2001, and the anthrax events that began in October 2001, tested federal response capabilities in ways they have never been tested before. Shortly following the September 11 attacks, major disaster declarations under the Robert T. Stafford Disaster Relief and Emergency Assistance Act triggered full federal response plan implementation and tested federal capabilities nationwide.¹¹

The anthrax events posed different, yet concurrent, tests for federal responders. Although none of the individual anthrax

events exceeded the capabilities of state resources, National Response Team members responded under the NCP, considering anthrax a pollutant or contaminant in accordance with the definition under CERCLA.

Under that definition, the NSF was deployed for both the September 11th attacks and the anthrax events that followed to implement ICS structures, perform on-site air monitoring, assist with sampling and health and safety support, and to establish wash-down stations for rescue workers at the World Trade Center; on Capitol Hill; in Boca Raton, Florida; and at other anthrax response locations. Following 9-11, the NSF has increasingly been deployed to national security events such as Winter Olympics and Super Bowls and other national special security events to be on standby for potential biological or chemical mass casualty events. Notwithstanding the traditional statutory NCP pollution preparedness and response roles, which utilize the array of support functions the NSF provides as a special team for federal OSCs, the NSF now has a new WMD and terrorism consequence management role.

About the author:

CDR Keith M. Donohue is the commanding officer of the Pacific Strike Team. His previous assignments include Coast Guard Activities Europe; MSU Port Arthur, Texas; Coast Guard headquarters, Environmental Standards Division; and MSO Providence, Rhode Island. He holds an M.S. in marine affairs and a B.S. in chemical oceanography.

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National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan.

Endnotes:

1. See www.nmmc.co.uk/index.php?collections/featured_pictures/remembering_the_torrey_canyon_disaster.

2. The Department of Interior, Department of Transportation, Department of Defense, Department of Health, Education and Welfare, and the Office of Emergency Planning.

3. Available at www.geog.ucsb.edu/~kclarke/Papers/SBOilSpill1969.pdf.

4. See www.infoplease.com/ipa/A0001451.html, for a list of oil spills and disasters.

5. See 40 FR 12658.

6. *Federal register*, Vol. 45, No. 55, Wednesday, March 19, 1980, p. 17832 -19833, and Franklin, B. *Toxic Cloud Leaks at Carbide Plant in West Virginia*. New York City: The New York Times, August 12, 1985.

7. Jasanoft, S. (1994) *Learning from Disaster: Risk Management After Bhopal*. University of Pennsylvania Press.

8. *The National Response Team: 1989 Annual Report*, Annex D, p. 66.

9. Storch Jr., and Captain R. L. *Report of a National Strike Force Study*; Commandant G-MER ltr, March 15, 1990. U.S. Coast Guard: NSF Study Itr'16450 of: 29 Jan 90.

10. See www.uscg.mil/history/.

11. P.L. 93-288 as amended by P.L. 100-707; Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (42 U.S.C. 5121, et seq.).



The Oil Spill Response Fund

Four decades of success.

by MR. ALLEN R. THURING
Senior Financial Analyst
Coast Guard National Pollution Funds Center

The Clean Water Act/Federal Water Pollution Control Act of 1972 (CWA) and the Oil Pollution Act of 1990 (OPA) are arguably the most expansive federal pollution laws. They provide guidance, and, most important for responders, create a range of response tools to deal with oil and hazardous materials spills on U.S. waters.

Key components include:

- an expectation that the spiller is responsible and liable to clean up the spill;
- creating the National Contingency Plan and defining federal on-scene coordinator authorities;
- creating “special teams,” including the Coast Guard’s National Strike Force and the Environmental Protection Agency’s (EPA) Emergency Response Team;
- financing a fund that pays for removals if the responsible party does not step forward.

The Coast Guard manages this fund, which:

- pre-empts the responsible party from using delay as a response option, despite the law;
- provides the federal on-scene coordinator the money to quickly hire private response companies if the responsible party does not act or if the spill’s origin is a mystery.

Funding Response

The 311(k) fund, named for the CWA section in which it appears, was used in its first year and during responses to a significant number of oil spills by 1973, engendering much growth in the spill response industry.

In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and its attendant fund, commonly referred to as “Superfund,” to pay for response to chemical spills and hazardous waste sites. Thus was born a dual-fund world: CERCLA/Superfund for hazardous materials, pollutants, and contaminants and 311(k) for oil.

The Exxon Valdez

In March 1989, that world was stood on its head when the *Exxon Valdez* ran aground in Prince William Sound, Alaska. The 311(k) fund balance that day was \$6.7 million. Fortunately, Exxon Corporation undertook the spill response and quickly repaid all the federal response costs, which eventually came to more than \$120 million.

This catastrophic event (and expense) engendered thorough Clean Water Act review, focusing most significantly on the adequacy of the 311(k) fund. In response, Congress passed the Oil Pollution Act of 1990 (OPA), which created the Oil Spill Liability Trust Fund (OSLTF). The OSLTF structure retained the 311(k) fund’s penalty and cost-recovery revenue and added dedicated excise tax revenues of one nickel per barrel of crude oil produced or imported into the United States, and the same amount for any refined petroleum products imported into the United States. Excise tax revenue currently exceeds \$400 million each year.¹

To the extent Oil Spill Liability Trust Fund monies are not needed for spills, Congress charged the Treasury with investing available OSLTF funds in its own securities. The Coast Guard National Pollution Funds Center (NPFC) and the Treasury review these amounts annually. Annual interest earned averages \$17 to \$18 million. Cumulative interest earned since OSLTF creation exceeds \$870 million.

Changes Under OPA

OPA also changed how the Oil Spill Liability Trust Fund was spent. The 311(k) fund was a revolving trust fund. If funds were available, the federal on-scene coordinator (FOSC) could use them to respond to a spill. If the fund balance fell too low, Congressional appropriations in the annual budget process augmented it.

Additionally, while the Clean Water Act allowed spending the 311(k) fund for oil or hazardous materials response, OPA

Historical Data

Year	Incidents	Removal Funds Obligated/Expended
1972	Data not available	\$1,180,547
1973	Data not available	\$9,439,340
1974	Data not available	\$4429964
1975	Data not available	\$7974507
1976	Data not available	\$15,318,823
1977	Data not available	\$8,643,653
1978	Data not available	\$9,922,986
1979	Data not available	\$18,741,710
1980*	Data not available	\$25,197,136
1981	Data not available	\$19,745,356
1982	Data not available	\$3,754,490
1983	369	\$1,941,534
1984	400	\$3,965,934
1985	305	\$4,447,173
1986	338	\$9,422,180
1987	278	\$3,924,246
1988	198	\$1,429,278
1989	235	\$35,508,608
1990	324	\$14,985,057
1991**	304	\$14,080,636
1992	437	\$8,276,922
1993	488	\$13,465,182
1994	514	\$49,701,236
1995	531	\$25,963,431
1996	576	\$31,066,127
1997	559	\$29,161,042
1998	624	\$33,137,823
1999	743	\$40,034,938
2000	646	\$50,527,350
2001	909	\$77,924,921
2002	493	\$59,975,180
2003	547	\$41,625,976
2004	504	\$43,087,052
2005	482	\$50,760000
2006	447	\$51,942,000
2007	425	\$47,712,687
2008	475	\$41,609,847
2009	418	\$45,744,104
2010	398	\$241,346,635
2011	399	\$273,667,321
2012	402	\$178,380,025
2013	342	\$94,579,524
*Passage of CERCLA		** Passage of OPA 90

restricted Oil Spill Liability Trust Fund use to strictly oil incidents. OSLTF provides three spending vehicles:

- an emergency fund,
- a claims fund,
- annual Congressional appropriations to the agencies charged with implementing OPA.

The Emergency Fund

The emergency fund pays for oil spill responses. It is an annual appropriation of \$50 million, which remains available until expended. Amounts that are unused at the end of the fiscal year are automatically carried forward to the next fiscal year and added to the new \$50 million appropriation.

In addition to the annual automatic appropriation, Congress amended OPA to allow the Coast Guard to request an advance of up to \$100 million in any year, when response costs exceeded the emergency fund's available balance. In 2010, Congress further amended this provision for the *Deepwater Horizon* spill response to allow the Coast Guard to make unlimited \$100 million advances to the emergency fund, as long as there were sufficient available funds in the overall Oil Spill Liability Trust Fund.

The Claims Fund

The claims fund is a permanent indefinite appropriation that is not subject to Congressional appropriation. This fund can

Year	Number of Claims Paid	Total Claims Paid
1993	247	\$11,138,129
1994	436	\$3,590,347
1995	265	\$2,625,552
1996	234	\$1,626,517
1997	1292	\$4,597,436
1998	598	\$3,696,498
1999	507	\$10,429,893
2000	601	\$2,400,572
2001	311	\$16,781,535
2002	299	\$7,026,961
2003	480	\$24,160,560
2004	239	\$7,035,355
2005	222	\$13,675,346
2006	180	\$16,131,140
2007	157	\$3,849,1257
2008	129	\$25,554,000
2009	156	\$70,830,204
2010	194	\$42,288,016
2011	228	\$38,190,636
2012	129	\$187,765,284
2013	131	\$84,636,182



only pay OPA claims resulting from oil spills when claims were either ignored or denied by the responsible party or for claims from mystery oil spills where no responsible party could be identified.

The claims fund limit is essentially the OSLTF available balance when the claim is adjudicated. OPA allows claims for various reasons, but they generally are for unpaid response costs, economic damages, or natural resource damages. OPA does provide two general limits on amounts that can be spent on an incident:

- no more than \$1 billion can be expended on a single incident,
- no more than \$500 million can be spent on natural resource damage claims for an incident.

The Coast Guard National Pollution Funds Center is delegated authority under OPA to receive and adjudicate all Oil Spill Liability Trust Fund claims, and more than \$700 million has been paid out of the claims fund to date.

Congressional Appropriations

Each year Congress appropriates funds to the Coast Guard, the EPA, and various other federal agencies charged with responsibilities under OPA. The total amount appropriated out of the Oil Spill Liability Trust Fund varies, but it generally totals around \$100 million each year. Congress can and does provide agencies with guidance from time to time on how these appropriated funds are to be used.

The Polluter Pays

The final major OPA provision affecting the Oil Spill Liability Trust Fund deals with spiller liability and cost recovery. This is commonly referred to as the “polluter pays” principle. If the Oil Spill Liability Trust Fund must be used for an incident, the responsible party is liable for all the costs that result from the FOSC’s actions, all emergency fund expenditures for the incident, and all claims fund expenditures that result from the incident.

The USCG NPFC tracks and compiles incident costs and expenditures and then bills responsible parties. If the responsible party does not pay promptly, the NPFC refers the debt to either the Department of Justice or the Department of Treasury for further collection activity. Currently, the Oil Spill Liability Trust Fund accounts receivable balance is more than \$289 million. Total cost recoveries to the fund exceed \$1.2 billion.

Success

So does the fund meet the goals set at its inception? Yes, by all measures, it has succeeded. Oil spills on U.S. waters are promptly cleaned up, either by the spiller or through the FOSC/National Contingency Plan structures. The fund also has proven to be eminently scalable, allowing response equally to small, localized spills and also major spills of national significance—most recently the *Deepwater Horizon* oil well blowout in the Gulf of Mexico.

Most importantly, for more than 40 years, every Coast Guard or EPA FOSC has been able to draw upon the appropriate funds for every oil response.

About the author:

Mr. Allen R. Thuring is the senior financial analyst at the Coast Guard’s National Pollution Funds Center. Since 1983, he has managed Coast Guard oil and chemical response funds. He was the Coast Guard fund manager for the Exxon Valdez response and has been involved with every major oil and chemical spill response since then. He is a former Coast Guard officer and has spent 43 years with the Coast Guard. He holds a B.A. from the University of Virginia and an MBA from George Washington University.

Endnote:

¹ OPA suspended the tax when the OSLTF balance exceeded \$1 billion, and Congress included a sunset provision that ended the tax on December 31, 1994. Congress reinstated this excise tax in 2006 and revised the tax provisions further in 2009. First, Congress removed the upper limit on the OSLTF balance that would suspend excise tax collection. Second, the excise tax was raised to \$0.08 per barrel of crude oil produced or imported into the United States, and the same amount for any refined petroleum products imported. In 2017, the excise tax rate increases to \$0.09 per barrel, and the excise tax is due to end on December 31, 2017.

For more information:

All fund statistics courtesy of the Coast Guard National Pollution Funds Center. For more information, go to www.uscg.mil/npfc.

Four Decades of Response

Four NSF team members recall their experiences.

by MR. PETER A. BRUNK
IMS Environmental

MR. MARK G. GREGORY
U.S. Coast Guard District 11 DRAT Equipment Specialist

MR. MIGUEL L. BELLA
U. S. Coast Guard National Pollution Funds Center

DC1 KEN W. BOND
Response Supervisor
U.S. Coast Guard Gulf Strike Team

The 1970s

by Mr. Peter A. Brunk

When I first came aboard the strike team, I had no idea what would be involved. I met Atlantic Strike Team (AST) personnel previously, while serving as USCGC *Sledge*'s commanding officer. At the time, we used their divers to recover submerged pilings at a lighthouse in Roanoke Sound, North Carolina. Most of AST's equipment was excess Army and Navy property—boats, motors, cranes, and trucks—then later, as the strike teams did more jobs, they were able to get better equipment.

In August 1975, I reported to the Atlantic Strike Team. The teams had just returned from two major oil spill responses:

- the tanker *Metula*, in the Straits of Magellan off Chile, in August 1974;
- the tanker *Showa Maru*, in Straits of Malacca between Malaysia, Indonesia, and Singapore, in January 1975.

Both ships were VLCCs (very large crude carriers) and both spills resulted from groundings. In each case, the strike teams used an air-deliverable anti-pollution transfer system (ADAPTS) for pumping operations. Unlike other gear, the Coast Guard developed the ADAPTS, which consisted of pumping systems, towable storage tanks, and a high-seas barrier. Each system could be delivered by parachute in winds up to 40 knots with 10- to 12-foot seas.

First Response

I went on my first major spill near my hometown in Baltimore, Maryland, just two weeks after reporting in. During a fuel transfer operation, approximately 250,000 gallons of No. 6 oil spilled into the harbor. We were there for 30 days, recovering product.



EM2 John Bishop and CWO Peter Brunk return to the command post after pulling oil containment boom. U.S. Coast Guard photo.

The Edmund Fitzgerald

In November 1975, the AST executive officer and I left Elizabeth City, North Carolina, in 74-degree Fahrenheit weather and arrived in Sault Ste. Marie, on the U.S. and Canadian border, in 17-degree Fahrenheit snowy conditions. As an ore ship followed the *Edmund Fitzgerald*, it disappeared from radar.

I went aboard a Navy airplane to look for the wreck. During the first pass over the ship's last known position, we received a contact with a magnetic anomaly detector and, after another pass, I noticed a small sheen. The ship had a diesel bow thruster.

We marked it and then went back to Sault Ste. Marie, where the crew's families were waiting. Later, aboard the CGC

Woodrush, we took a picture of the wreck on the bottom, with an experimental side-scan sonar.

Vessel Responses

In December 1975, we worked with the Gulf Strike Team when a barge became stranded in the surf line west of San Juan, Puerto Rico. No. 6 oil was pouring out of the barge, and for the next 37 days, we used ADAPTS to pump off the barge.

In January 1976, we responded to a grounded vessel in Rodanthe, North Carolina. The vessel had been en route to a scrap yard in Texas, under tow, when the hawser parted during a storm and the ship went on the beach. The ship had a belly full of No. 6 oil in its double-bottomed tanks. We went aboard and set up ADAPTS to pump the product up to the ship's deep tanks, so it could be refloated. While working this job, we received a call about a possible spill off Virginia's Eastern Shore.

So, I went from Cape Hatteras, North Carolina, to the eastern shore of Virginia, via CG helicopter, and found 200,000 gallons of No. 6 oil on approximately 20 miles of shoreline. It was a massive cleanup operation, lasting 30 days. We had 900 open-topped drums filled with oil and debris.

A friend who served with me on the USCGC *Madrona*, and I discovered a way to burn the oil.¹

In May 1976, a tug near Cleveland, Ohio, was trying to shift from a hawser to pushing and got a line in the screw. Its barge had hit a jetty, and by the time I got aboard, it was sinking. We used a 50-ton steam derrick to hold the barge until we rigged the air-deliverable anti-pollution transfer system. We pumped No. 6 oil from the barge into another barge. There was no cleanup, as it was very rough, and the product dissipated.

The Argo Merchant

In December 1976, we arrived on the scene of the M/V *Argo Merchant*, which ran aground on the Outer Nantucket Shoals. The Coast Guard removed the crew and used the USCGC *Bittersweet* and *Spar* and Army sky crane helicopters to put ADAPTS and other equipment onboard.

There were a lot of problems, due to the weather and the vessel's location. The ship broke in half three days before Christmas, spilling approximately 7.5 million gallons of No. 6 oil, which dispersed in heavy seas.

Neither Rain Nor Sleet Nor Snow

In January 1977, a helicopter put me on a tug to assist the captain on a barge that ran aground in Tangier Sound, Maryland. The tug was in the notch, trying to back off of



The SS *Edmund Fitzgerald*. Photo courtesy of the National Oceanic Atmospheric Administration.

Shark Fin Shoals. I told the mate to get out of the notch, put the hawser on the bow, and pull. We refloated the barge and anchored it in Hooper Straits.

I called the helicopter crew at Patuxent River Naval Air Station to come and pick me up, but we could not go to Elizabeth City, North Carolina, as it was snowing and blowing a gale, and the helicopter was icing up. When we got back to Patuxent, the helicopter basically fell the last 15 feet onto the runway. It was a rough landing.

Shortly after that, a CG helicopter put me on another tanker in heavy ice conditions in the Chesapeake Bay. The tide was flooding, pushing the ship against a dredge spoil area outside of the channel. We had tugs there pulling, but making no progress. I suggested that one tug proceed close to the ship to relieve the pressure from the ice. As soon as the tug pushed through the ice, the ship rocked and moved about



Oil leaks from a barge. U.S. Coast Guard photo by BMC Bill Lockwood.

20 feet. After a few more passes by the tug, the ship refloated with no damage.

In February 1978, we flew in a C-130 to Stewart Air Force Base, New York, to respond to a barge taking on water in the Hudson River. It was a bad landing in snow with zero-degree weather. We went to the barge via the CGC *Sweetgum* and used ADAPTS to stop the barge from sinking. We had a lot of problems, as ice was up to three feet thick on the Hudson River. We used the barge's engine/pump to remove No. 6 oil and refloated the vessel.

The after-rake on an ice-covered barge flooded in January 1978, and the tug put the barge aground at Eatons Neck in Long Island, New York. No. 2 oil was released from the barge but dissipated, as it was very rough. LT Joe Kuchin, BM2 Jim Klinefelter, and I went aboard the barge via the Huntington Bay harbormaster's boat, and we tightened up some of the hatches and used the barge's engine to pump off the remaining product into another barge.

When this job was finished, we proceeded to Portland, Maine, via C-130, where a coastal tanker ran aground. Fortunately, the tanker was not leaking. It was refloated with no problems and docked in Portland. As soon as the tanker was secured, it started snowing.



DC2 Bruce Firth leaves a barge after securing loose hatches. U.S. Coast Guard photo by PAC Dale Pucket.

During the night, we received a call about a tanker dragging anchor and in trouble in Salem, Massachusetts. The tanker ran aground, putting holes in the engine room and in at least one tank with No. 6 oil. We could not get to Salem, as all roads were closed due to the blizzard, so I spoke with the commanding officer of the CGC *Spar*, and he said he could take us and our equipment to the tanker.

Upon arrival, we put our equipment onboard and started setting up the ADAPTS pumping system. During this

response, a civilian salvage man actually swam under the engine and put a patch on the hull.

Arctic Response

In July 1977, the strike teams experienced their first true Arctic response when a tanker hit an underwater iceberg and spilled approximately 100,000 gallons of product in Baffin Bay, Greenland, more than 300 miles north of the Arctic Circle. We moved equipment from a Navy facility at Cheatham Annex in Virginia, using a C-5, C-130s, and a C-141 airplane and skimmed from the USCGC *Westwind* and USNS *Mirfak*.

About the author:

CWO4 Peter A. Brunk retired in 1980 with 26 years of Coast Guard service. He served as skipper of the Nantucket lightship from March 1970 to July 1971, and as operations officer for the Atlantic Strike Team from 1975 to 1978. He was skipper of CGC *Sledge* for the second time when he retired. He now works for IMS Environmental/Hepaco in Norfolk, Virginia.

Endnote:

¹ In addition to oil and debris, we had tens of thousands of dead ducks. We received an air permit for the burn from the EPA, and used my friend's stump burner to provide air.

The 1980s

by Mr. Miguel L. Bella

I arrived at the Pacific Strike Team (PST) in the summer of 1980, finding a hangar devoid of any personnel except for the executive officer and the operations/dive officer, as most of the crew and the skipper were off battling an oil spill in Mexico.

Working hard and with the help of my teammates, I memorized pumping capacities for all the equipment, load weights for pallets used on C-130s, and worked hard to learn my storekeeper job.

During one drill, we were outfitted in chemical suits and played basketball until the bottles emptied and the face-masks collapsed into our faces. That drill taught us what it feels like to run out of air and to deal with the situation calmly.

I passed my board qualifying as a response member and was finally able to carry my own weight. Soon the team was off and running, fully outfitted with a new "chem van" and lots of equipment. That was the start of PST's chemical responses.

Chemical Response

In July 1981, the PST responded to a chemical facility explosion in Santa Fe Springs, California. This was the first time we entered a site in Level C personal protection equipment¹ and the first time the regional Environmental Protection Agency (EPA) utilized the Superfund. As the EPA did not

have a way to track cost, I adapted the CG forms to fit the EPA's requirements. This provided a way to track all financial information for the case and would ultimately lead to the EPA's system in use today.²

In July 1982, we responded to a waste processing facility in Escondido, California. Battling 107-degree Fahrenheit heat, the PST successfully made its own Level A entry,³ with no outside support, and categorized and secured a site that had been a community eyesore and health hazard. My teammates and I completed the first PST entry in fully encapsulated chemical suits. I remember being frightened, but I stuck to our training and to the task. As we exited the site and walked through the decontamination wash-down, I was glad to breathe regular air again, and I poured about a pint of sweat from each boot.

The Right Stuff

In March 1982, we were fortunate to have our PST facilities become part of the movie "The Right Stuff" which focused on test pilots. During filming, the PST crew sometimes participated as extras. If you rent the movie today, you can see the PST hangar in various scenes, along with great cameo shots of our bathroom.

I returned to the Pacific Strike Team in 1987 and found the unit spent about 70 percent of its time on chemical response, 20 percent oil response, and 10 percent on other stuff, including training and static displays. I was not there but a week, and off I went to assist with an asbestos hazmat site.

During the following few years, I deployed to the western states, assisting EPA FOSCs with hazard categorization, cost documentation, and occasionally used my commercial license to drive 18-wheelers and other big rigs.

1989: The Year that Never Seemed to End

Early in 1989, we responded to a call for assistance from MSO Honolulu, Hawaii. Due to a storm, the *Exxon Houston* was in danger of breaking from its fuel moorings. During that response, we noticed an Exxon calendar on the bulkhead. My teammates and I examined the vessels for January, February, and stopped short on March. We looked at each other and agreed that we'd never want to see such an enormous vessel in a real response. The *Exxon Valdez* was fine where she sat—on the calendar.



A chemical storage site, Escondido, California, July 1982. SK3 Miguel Bella and MK1 Bill Price, first Pacific Strike Team "Level A" entry. U.S. Coast Guard photo.

Well, never say "never." In March, I answered an early-morning page, to find that, sure enough, *Miss March* had grounded (ironically, in March).

I came into my own during the *Exxon Valdez* response, and learned how to swing loads from Chinook helicopters; figured out the language required to order DOD assets including C-5A's; organized check-in and -out procedures for local, federal, and state responders; created forms that captured personnel and equipment hours; and then converted that information into a billable format (used to invoice Exxon directly).

Then in October 1989, the Loma Prieta earthquake devastated the San Francisco Bay area. We were called out to use our pumping capacity to transfer more than 80,000 gallons of gasoline in a Richmond, California, refinery.

All told, in 1989 alone, the PST deployed to more than 20 hazmat and oil responses, requiring more than 3,460 man-days, and for our efforts, we received the Coast Guard Foundation Admiral John B. Hayes Award.

About the author:

Mr. Miguel Bella served in the Coast Guard for more than 21 years and retired as a chief warrant officer. His assignments included CGC Resolute, two PST tours; plank owner for D11DRAT; CGC Hamilton; and finishing off his active duty in San Pedro, California. During 9/11, he responded as a member of the CG National Pollution Funds Center, where he currently serves as a regional manager in the Case Management Division.

Endnotes:

¹ See www.cbohsep.org/Libraries/MRC_-_Training_-_Basic_Training/Personal_Protective_Equipment_and_Decontamination.sflb.ashx.

² See <http://infohouse.p2ric.org/ref/01/00047/4-05.htm>.

³ The highest level of protection.

The 1990s

by Mr. Mark G. Gregory

When I arrived at the Pacific Strike Team in summer 1992, I had no idea what I was getting into. My Coast Guard experience at this point was on an icebreaker, an aids to navigation team, and on a patrol boat.

At that time, most crew members were *Exxon Valdez* veterans, and the strike team was all about big equipment. Dracones¹ the length of football fields, tractors, and trailers were parked all around the property.

On-the-Job Training

One of my first jobs at the team was to dispose of a dracone that had been returned from *Exxon Valdez* that would leak oil when the sun shone. In Novato, California, in the summer, this was every day. So really my first spill cleanup at the PST was in the back yard, where I learned the value of lots of sorbents, secondary containment, and wearing rubber gloves.

In October 1992, I participated in a large salvage/oil spill drill, in Valdez, Alaska. Here I learned the value of a can of ether, while hand-cranking a prime mover on a frozen pier. In January 1993, the area around Riverside, California, flooded, causing oil wells to leak. We assisted State Fish and Game personnel in contractor oversight during the oil spill cleanup.

After this, I finally got to make Level B entries at a chrome plating facility in Las Vegas, Nevada. We pumped all kinds of plating liquids into drums for offsite disposal. The owner had left a 1970s motorcycle on the site, so to keep up our fitness level, we pushed each other around the site on the bike in our Level B equipment.

Oil Responses

In March 1993, we pumped waste oil from a barge near Antioch, California. The next month, I arrived in Port Arthur, Texas, in the middle of the night and went to work on a barge, skimming oil. This was my first time working for the Gulf Strike Team. They called us "pumpkin heads," because we wore orange hardhats. They would soon start to call me "Gulf Team West," because I spent so much time working with them.

The next response was a classic example of some of the poor decisions that lead to oil spills. A facility owner cut the top off of his storage tanks for the scrap metal. An

ensuing 11-day heat wave caused the asphalt in the tanks to expand and overflow into Philadelphia's Schuylkill River. So we spent the July 4th weekend clearing up the waterfront.

In August 1993, I was in Tampa, Florida, for the response to the collision involving M/V *Balsa 37*, the tug *Seafarer* and barge *Ocean 255*, and the tug *Capt. Fred Bouchard* and barge No. 155. During this job, we pumped gasoline, deployed boom, skimmed oil, and just generally used most of the oil spill equipment in the strike team inventory.

Hazmat

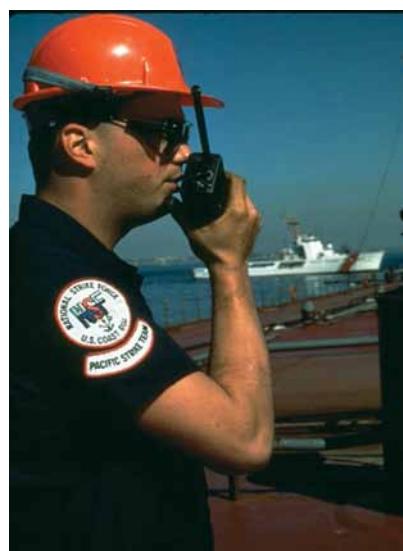
Back to California, we worked an asbestos site on the gravel roads of Calaveras County, California. (Who knew asbestos is naturally occurring?) We conducted air monitoring and drove around creating a lot of dust, trying to figure out how much asbestos was in the road material in a potential housing development.

We spent a month in Honolulu, Hawaii, in June, collecting paint cans from the bottom of Keehi Lagoon, conducting hazard categorization, and bulking them for disposal. In August, I was in Vancouver, Washington, where a plating facility had a leaking tank that was jeopardizing the city's water table. We removed the liquids and handed over the damaged part of the tank to EPA investigators for evidence.

Back to the Gulf, I was in Houston, Texas, for San Jacinto flood relief. This was huge, as we dealt with flooding, ruptured pipelines, oil and gasoline spills, and a fire. We developed some great alternate strategies to remove the oil and gasoline from swamps and forested areas, including burning and building weirs to separate oil from water. We also collected orphaned hazardous material and conducted air monitoring.

January 1995 started with a bang, when a tug and barge ran aground during a bad storm off Crescent City, California. We worked with a tug to pass a line and get them towed out to sea when the weather subsided.

The following month, I went to Denver, Colorado, responding to radioactive and toxic waste in a residential neighborhood. We conducted site safety and air and radiation monitoring, while bulking and packing the drums to be shipped off-site for disposal. I had never worked with radiation before, and for the next year I returned to this site several times.



DC1 Greg Schultz communicates with Pacific Strike Team members, while aboard a tanker, 1991. U.S. Coast Guard photo by CG Public Information Assist Team.

Flooding

In March 1995, the strike force responded to major flooding in Monterey, California. We used National Guard helicopters to find orphaned drums, cylinders, and tanks, which we would collect and bulk the wastes for disposal.

We also responded to major flooding in the St. Mary's, Idaho, area in early 1996. Once again, we used National Guard helicopters to find orphaned drums, cylinders, and tanks. We pulled oil tanks and drums out of trees and back yards.

In March 1996, we responded to a mystery bird kill in St. Paul, Alaska. We arrived at the Loran station to capture oiled birds, clean them, and take care of the ones that did not survive. The oil came from a passing vessel (later caught in a foreign port).

While in Alaska, our mission changed, when a fishing vessel ran aground in the middle of the night. We borrowed pumps, hoses, and a tank truck from the locals; built a high-line system; and were able to pump enough fuel off the vessel to make it light enough to be towed free.

Transitions

I left the strike team in 1996 to go to the CGC *Cowslip*; and, in 1999, I was home sweet strike team home again. Later that year, we responded to a large tire fire in California and provided air monitoring, communications, oil recovery, and all the other things the strike team does on any site.

The year ended for me in Pago Pago, American Samoa. During a hurricane in 1991, multiple vessels grounded and although most of the hazards had been removed, now they had started leaking again. We provided support in removing oil and anhydrous ammonia from the grounded vessels. We swam to work every day; and, by the end of the job, we were all great swimmers and experts in diaphragm pumps.

In the middle of all these jobs, we found time to learn and then teach the Incident Command System, oil spill and hazmat response, and conduct VOSS, SORS, and lightering drills. I left the team in 2002 and then came back in 2006, as the engineering officer—not bad for a boatswains mate.

About the author:

Mr. Mark Gregory retired from the U.S. Coast Guard in 2013 after 27 years. He continues to work in the emergency response industry.



Pacific Strike Team and Gulf Strike Team members gather for a picture after completing a successful response, July 1991. U.S. Coast Guard photo by MK1 Fred Valadez.

Endnotes:

¹ Flexible containers used to store/transport liquid.

The 2000s

by DC1 Ken W. Bond

In 2000, I received orders to report to the Atlantic Strike Team (AST). I had no science background, knew nothing about environmental work, and thought response was about stopping a boat from sinking.

My first year or so at the AST consisted of education and a variety of EPA Superfund cleanup site visits. These deployments varied in their assignments, from making Level B hazmat entries into burned-out warehouses to gauging rail cars.

9/11

Everything changed on the morning of September 11, 2001. I was in Level C personal protective equipment, sampling an acid tank at an abandoned leather tannery in upstate New York, when I heard that an airplane had crashed into the World Trade Center in New York City.

Two days later, I was standing on top of the Staten Island Landfill at Fresh Kills, New York. My assignment there was to develop a worker safety and air monitoring plan for the sorting operations underway to recover human remains from the debris being removed from ground zero.



Petty Officer Kenneth Bond, a damage controlman with the U.S. Coast Guard Gulf Strike Team, surveys damaged rail cars in Braithwaite, Louisiana, after Hurricane Isaac. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

No Rest for the Weary

With the response to the World Trade Center still in full swing, another event captured the headlines and signaled my next deployment—anthrax. Persons unknown had mailed a letter containing anthrax to a senator in the District of Columbia, contaminating the mail room and office buildings around the Capitol, and bringing everything that takes place there to a standstill.

Arriving at dusk, I helped establish an entry point and dress-out area to begin sampling offices in the Hart Senate Office Building. I worked the night shift for the next month, supervising more than 100 sampling and evidence collection entries. While entries were taking place, the NSF command element was staffing Incident Command System positions to maintain control of what started out as a panic situation. All of these efforts led to a successful six-month cleanup operation.

More Headlines

In early February 2003, people watched in horror on national television as the Space Shuttle *Columbia* disintegrated over Texas. That evening found me in Jasper, Texas, where I supervised 20 collection teams in a volunteered private aircraft hanger, which would soon become the central shipment location for all the debris.

Then in April, Senate Majority Leader Frist was mailed a letter containing ricin, a highly toxic substance. Again, the National Strike Force responded to our nation's capital, leading the charge in key ICS positions and leading entries for sampling and decontamination.

As with the anthrax case two years before, I drew night shift, but unlike before, we had a deadline. Saturday night, the unified command informed us that the Capitol would re-open Monday morning. The day shift was recalled, all remaining personnel at the Atlantic Strike Team mobilized, and the longest day began. We completely decontaminated the affected areas of the building and a weary crew packed up by 7 a.m. Monday morning. Some crew members worked a 48-hour shift, but we got the job done.

The next event would test our oil spill response capabilities, as the tank vessel *Athos I* struck a submerged object in the Delaware River near Philadelphia, Pennsylvania, spilling 265,000 gallons of heavy oil. When lightering was complete and the ship patched up, I demobilized from the case. Four months later, I again received orders to the *Athos* response, with marching orders to wrap it up. On my arrival, 1,800 workers were present on the response. During the next three weeks, we reduced the amount of workers to less than 100.

From the “you can't make this stuff up” file, we deployed to New York City to assist the EPA with anthrax cleanup. A gentleman living in Manhattan, who made authentic tribal drums using imported animal hides, had contracted inhalation anthrax, prompting the decontamination of his workshop and apartment. A full AST hazmat team responded.

In 2005, Hurricanes Katrina and Hurricane Rita pummeled the Gulf Coast. My assignment for both storm responses was vessel salvage—finding vessels wherever they ended up, cataloguing them, finding the owners, and overseeing vessel removal. One vessel, in particular, a 220-foot long Soviet ship, purchased after the cold war, had been sitting idle for decades. This ship was sitting high and dry on a beach with no known owner. I explored this dark ship, making note of the Cyrillic writing, trying to translate it, so we could remove fuel and oil from the vessel. Eventually the ship was scrapped in place, after we removed more than 100,000 gallons of heavy fuel oil from its bunkers.

Changes

In 2006, I left the National Strike Force and rejoined the cutter fleet, spending my days working navigational aids in the Mississippi and Missouri rivers, and realizing that I had to get back to the response world. I was an observer, stuck on the sidelines, watching events on the news change or damage our country, and couldn't do a thing about it.

I got my wish in 2009, when I received orders to report to the Gulf Strike Team. I only needed an introduction to new equipment and policies since I was previously qualified; soon enough, I was back out responding to oil spills in the middle of the night.

The 2010s

In April 2010, a dredging operation dropped a spud on a 10-inch crude oil pipeline, in (of all places) the middle of a wildlife refuge. In all, the response was a huge success, and we finished pulling 80,000 feet of oil boom out of the water just days before the largest oil spill in history.

Deepwater Horizon

In May 2010, I reported to Houma, Louisiana, as special monitoring of advanced response technologies group supervisor, determining oil dispersant effectiveness. This role would challenge me like never before, as I played three-dimensional chess with real people, boats, and aircraft on a board that was 100 miles away from the actual event.

Once the well was plugged and dispersant use ended, I moved on to different roles—such as figuring out how to use logging helicopters to recover oil boom from environmentally sensitive areas.

Recovering Our Own

In March 2012, tragedy struck the Coast Guard when a helicopter crashed in Mobile Bay, claiming the lives of all aboard. The Gulf Strike Team mobilized to recover the deceased crew members. The greatest hazard on this response was the emotional pain that everyone involved was going through.

During this response, I would show up at the command post, give a briefing to the captain of the port, and then head out to the field where I would meet with search teams, assess their mental states, and call in Critical Incident Stress Management team members where needed.

As we brought the last crew member to the dock, Coast Guard and family members lined its entire length, all rendering salutes, as we brought one of our own ashore for the last time.

Hurricane Isaac

When Hurricane Isaac made landfall in August 2012 in Louisiana, it battered coastal towns all the way to New Orleans and pushed an 11-foot storm surge ashore. I responded to a chemical transfer facility.

Isaac inundated them with 13 feet of water, floating storage tanks off their foundations, breaking piping, and derailing 180 chemical rail cars. For the next two weeks, I oversaw rail car re-railing and served as a liaison between state and federal agencies.

Continuing Deployments

In May 2013, I found myself on a plane heading for another deployment—this time to Panama. The Panama Canal Authority requested a GST team to evaluate their canal expansion project response plans. For a week, I toured the area, examined response capabilities, and made recommendations for improvements to their incident command structure, hazmat response department, and evacuation plans.

I've heard sea stories all my life, but somehow, National Strike Force stories seem just a bit grander, a bit larger. Every one of my 120-plus deployments tells a story, some funny, some that would make a person cry, but each one unique in its own way.

The NSF has proven time and again that when things look their worst, that's when we are at our best.

About the author:

DC1 Ken Bond has served in the U.S. Coast Guard for 19 years in many capacities, most notably as a response supervisor for the Atlantic and Gulf Strike Teams. He has received a Meritorious Service medal, two Commendation medals, and an Achievement medal. DC1 Bond has also earned a NIMS ICS Type II operations section chief qualification.

Editor's note: Some of the incident statistics and information in this article come from internal Coast Guard reports and may not be available online.



Fathoms Below

The Coast Guard NSF Dive Program.

by CDR JOANNE HANSON

Deputy Commander

National Strike Force

U.S. Coast Guard National Strike Force Coordination Center

When the National Strike Force (NSF) was established in 1973, its primary mission was response to pollution in the maritime environment. Those early years of the NSF pre-dated double-hull requirements and spill response plans, and none of the expansive privatized response assets available today were yet in existence.

As a new facet to Coast Guard operations, each strike team was staffed with boatswains mates, damage controlmen, machinery technicians, storekeepers, and yeomen, plus an assortment of command cadre officers. And, as strike team operations were new to this eclectic crew, one of the collateral duties was dive qualification.

These members attended U.S. Navy dive training and combined this skill with their pollution response training to provide the on-scene coordinator with a complete report on vessel damage and mitigation options. All NSF divers were assigned to the Atlantic Strike Team (AST), but deployed

nationwide to support NSF operations that required the capability.

Frogmen, Guardians, Spies

Prior to NSF creation, divers had a varied and somewhat obscure history in the Coast Guard. Dating back to World War II, Coast Guard divers trained as "frogmen," charged with reconnaissance, underwater infiltration, subterfuge, and other covert operations. This program evolved into the Central Intelligence Agency's covert operations, the U.S. Navy SEALS, and the Special Operations Command.

At the end of World War II, the Coast Guard's focus shifted back to domestic operations, and divers deployed to conduct vessel inspections, buoy recovery, and sunken vessel and aircraft surveys. During the height of the Cold War, they engaged in security missions (returning to their World War II roots) and conducted underwater inspections on all vessels arriving from communist nations.

NSF Dive Program Disbanded

In 1987, shortly before the Atlantic Strike Team was disestablished, the National Strike Force dive program was also disbanded. Despite its short history, there are two notable facts about the NSF dive program.

First, DC1 Perry (see sidebar) represents the only fatality in the 40-plus-year history of all NSF operations, which includes hazardous materials, oil spill, and weapons of mass destruction missions in environments from the tropics to the Arctic. Second, the AST claims the Coast Guard's first female diver—BM1 Linda Munoz, assigned in 1984.

The Mission Continues

While divers are no longer part of the NSF capability, the program remained a vital part of Coast Guard operations. Continued as a collateral duty, the program evolved in a post-9/11 world to include underwater pier security as part of the anti-terrorism mission.



A diver signals how much air he has remaining after completing hull inspection. U.S. Coast Guard photo by Petty Officer Michael Anderson.

DC1 Dennis Perry

In 1973, DC1 Dennis Perry transferred from the Navy to the Coast Guard. Perry was a Navy first class diver and part of the experimental dive program. He was assigned to the Atlantic Strike Team NSF dive program, based in Elizabeth City, North Carolina, at that time.

Tanker Response

In spring 1974, a tank vessel grounded by the bow in the St. Lawrence River. The damaged tanker was releasing oil, and the AST deployed a response team. In addition to Perry, his teammate and friend, BM1 Frank Ellinwood, responded to the incident.

Ellinwood was a newly graduated diver on his first operational dive mission. DC1 Perry and LT Barry Chambers were performing a dive operation off a barge positioned next to the grounded tanker when tragedy struck. According to BM1 Ellinwood, when the divers surfaced, they appeared in distress. BM1 Ellinwood, who was standing at the ready, remembers moving to assist LT Chambers. LT Chambers immediately re-directed BM1 Ellinwood to help DC1 Perry.

Then, the situation took a fateful turn. DC1 Perry, who had surfaced briefly with LT Chambers, submerged. The divers raced to the other end of the barge, following his bubbles, as the rapid current dragged him the length of the barge. By the time BM1 Ellinwood and his dive partner entered the water, there was no sign of DC1 Perry. His body was never recovered.

The Legacy Continues

Following the *Exxon Valdez* spill, the AST was re-established in 1991 at Fort Dix, New Jersey, and the new AST building was dedicated to DC1 Perry. The National Strike Force has also established the DC1 Dennis Perry Enlisted Person of the Year award to recognize outstanding contributions and achievements by enlisted personnel at the three strike teams. The inaugural DC1 Perry Award recipient will be recognized for 2014 accomplishments.



Dedication plaque for DC1 Perry at the Atlantic Strike Team. U.S. Coast Guard photo by LT Kristen Potter.

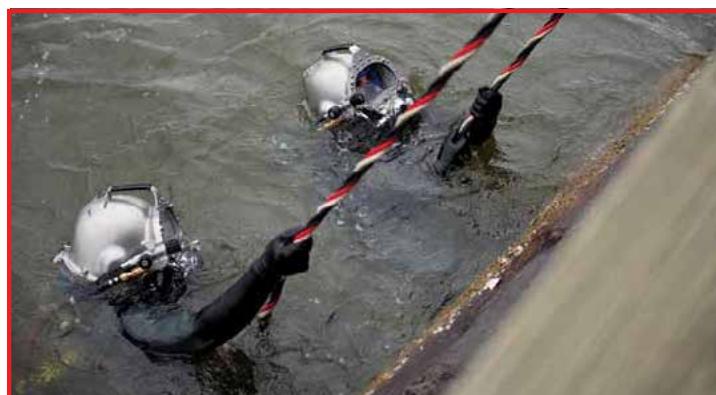
Employed on maritime safety and security teams and the maritime security response team, divers added to the Coast Guard's robust terrorism prevention and response posture. Meanwhile, divers at other units were still used for ship's husbandry, aids to navigation, and cold-water diving.

Tragedy Engenders Change

The program remained a collateral duty until an unfortunate incident happened on Aug. 17, 2006, when LT Jessica Hill and BM2 Steven Duque attempted a cold-water dive off the CGC *Healy*, north of Barrow, Alaska. Their deaths launched a Congressional inquiry and a complete programmatic assessment that revolutionized the Coast Guard diving program.

The first step was eliminating diving as a collateral duty and creating the Coast Guard dive lockers under the Deployable Operations Group. As a result, in 2008, the dive program became standardized and members equipped and trained as a deployable specialized force with a focus on safety and training for high-risk operations.

Then, in 2013, the Coast Guard created a new dive enlisted rating and chief warrant officer specialty, which allowed members to focus on retaining competencies and proficiencies without being hindered by lack of advancement, because they were assigned out of their enlisted rate. Today, Coast Guard divers conduct missions that include ports,



Coast Guardsmen participate in a training exercise at Base Portsmouth. U.S. Coast Guard photo by Petty Officer Walter Shinn.

waterways, and coastal security, underwater ship's husbandry, aids to navigation, and cold-water diving.

About the author:

CDR JoAnne Hanson is the National Strike Force deputy commander and the U.S. Coast Guard National Strike Force Coordination Center's executive officer. She has enjoyed 11 years assigned to the National Strike Force, including service as AST operations officer, NSF force manager at the Deployable Operations Group, PST executive officer, and NSF Operations Officer at the NSF Coordination Center.

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Federalized and Privatized Oil Spill Response

Accountability through oil spill response capability.

by LT JONATHAN COOPER

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Today's debate about the government's size and what services it should provide has become a heated topic. It wasn't so different in the late 1960s and early 1970s, when the nation established a goal to eliminate man-made water pollution.

The Clean Water Act

The Federal Water Pollution Control Act of 1972, also known as the Clean Water Act, was part of a fervent movement, since the popular view was that oil pollution renders public beaches unfit for bathing, creates fire hazards around harbors and docks, and harms fisheries.

Notable oil spills of the time, including those that resulted from the *Torrey Canyon* shipwreck in 1968 and the *Argo Merchant* sinking in 1976, engendered Coast Guard oil spill response innovations such as the airborne oil spill surveillance system, the air-deliverable anti-pollution transfer system, the fast-delivery sled system, and the open water oil containment and recovery system.

The Coast Guard National Strike Force (NSF), formed in 1973, benefitted from all of this newly developed oil spill response equipment. During the next decade, however, a tug-of-war played out between industry and the government. Throughout the late 1970s and 1980s, as the Coast Guard expanded its oil spill response program, industry was developing an oil spill response capability of its own.

A Game-Changer

This would be resolved in the aftermath of the *Exxon Valdez*, through a series of legislative actions and industry's commitment to be part of the solution.

For example, the Oil Pollution Act of 1990 (OPA 90) emphasized the concept that "the polluter pays" and mandated that industry maintain oil spill response equipment adequate to address a worst-case discharge, which sent a clear signal that the responsibility for responding to a spill was squarely on the shoulders of the spiller.

Although industry was required to fill the gaps in oil spill response capability, this is easier said than done. What about "mystery spills" where it is difficult or impossible to determine the responsible party, or if the "responsible party" is a hurricane or other natural disaster? Additionally, major spills after the *Exxon Valdez* highlighted the need for the Coast Guard to maintain a first-response mechanical recovery capability at the port level, while the industry was building its capacity.

For these and myriad other eventualities, USCG marine environmental protection program managers and the National Strike Force remained committed to the oil spill response mission, and the Coast Guard Research and Development Center continued to develop specialized equipment.

VOSS and SORS

One option was to equip Coast Guard buoy tenders with oil spill recovery capability, so that they can serve as vessels of opportunity for spill response in their operating areas. This initiative led to the vessel of opportunity skimming system (VOSS) and spilled oil recovery system (SORS).

The next development to follow as a result of the Oil Pollution Act, was the U.S. Coast Guard's initiative to build the



next class of sea-going buoy tender—the Juniper class—that incorporated built-in oil spill response gear.

Another key element aligned with the Oil Pollution Act of 1990 was the mandate to create a national database of response resources, and thus the Response Resource Inventory (RRI) was born. At the time, industry used a DOS-based computerized data collection tool to submit their resources to the National Strike Force Coordination Center to incorporate into the inventory. The RRI application also included a bulletin board system and classification module.

Federalized vs. Non-Federalized Responses

The Response Resource Inventory, specifically its classification module, accommodated the plan holder's needs by vetting response organization's capability, so the plan holder can make the appropriate response organization selection, which was a significant step toward shifting the responsibility of oil spill cleanup to the industry or spiller.

This put industry in a more primary oil spill cleanup role, with the Coast Guard shifting its role to oversight and management. Further, coupled with the requirements for facility response plans, vessel response plans, and certificates of financial responsibility, this comprised the comprehensive program we know today.

Furthermore, shifting the Coast Guard's role to industry oversight and management was a step toward developing partnerships with industry that would revolutionize spill response techniques. The shift, however, did not relieve the Coast Guard of the responsibility to ensure an effective national oil spill response capability. As such, the Coast Guard participates in a partnership action team that includes the Spill Control Association of America (the for-profit spill contractor trade association), and the Association of Petroleum Industry Cooperative Managers (the non-profit spill response trade association).

The Coast Guard's Role

After the 9/11 terrorist attacks, the public's focus turned to national security and the result was the Maritime Transportation Security Act, which (like OPA) mandated that facilities and vessels provide facility security plans (similar to the OPA-mandated facility and vessel response plans). Similarly, the Coast Guard's emphasis also moved toward security checks.



Atlantic Strike Team members Petty Officers Kyle Johnson, James Maida, Eugene Peters, and Steven Weintraub work with the crew of the Coast Guard Cutter *Marcus Hannah* to launch a vessel of opportunity skimming system. U.S. Coast Guard photo.

Fortunately, the National Strike Force's missions continued unabated. Of course, the fact that marine hazmat and oil spills continued was not fortunate, but as far as national response capability was concerned, it was fortunate that the National Strike Force was mission-ready for the *Deepwater Horizon* response.

Even so, the response's complexity required the Coast Guard to re-evaluate its role as oversight and management, due to the overwhelming public outcry that industry was not doing enough.

Response takeaways: The oil spill gear that was developed during OPA 90 was utilized and put to the test, which led to improved oil spill technologies and equipment. It was also apparent that the public expects the U.S. Coast Guard to maintain oil spill equipment in the event a large spill requires government assistance.

About the authors:

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LT Michael Clausen is the Panama City Marine Safety Detachment supervisor. He was a federal on-scene coordinator representative at MSU Galveston and a response supervisor at the Gulf Strike team. He is a graduate of Harvard University's extension program in environmental management and is currently working on his doctorate in environmental management from Colorado Technical University.

Mr. Richard Gaudiosi is the president of the Delaware Bay and River Cooperative Inc. He retired from the Coast Guard as a commander, after 23 years of service. He is also a former commanding officer of the Atlantic Strike Team.

The *Exxon Valdez* Spill

Twenty-five years later.

by MR. GARY A. REITER
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When the *Exxon Valdez* grounded at Bligh Reef at about 12:30 a.m., on March 24, 1989, Coast Guard and Alaska Department of Environmental Conservation investigators determined that the vessel lost approximately 215,000 of the million-plus barrels of oil onboard.

Lightering

The Pacific Strike Team (PST) was notified of the incident at about 2 a.m. on March 24, and the crew deployed from their facility in Novato, California, with a C-130 aircraft-load of pumping equipment to assist with lightering operations. Two PST members were sent to Anchorage, Alaska, to prepare the open water oil containment and recovery system (OWO CRS) pre-staged at Elmendorf Air Force Base, for delivery to Valdez.

The grounded vessel was in an unstable condition, and the remaining 1,040,000 barrels of oil posed a significant and continuous threat to the environment. In total, National

Strike Force (NSF) and commercial lightering resources offloaded 1,024,000 barrels of oil within a 13-day period, preventing further pollution from entering the environment and allowing the salvage team to stabilize and safely re-float the vessel.

Oil Containment

On March 28, the OWO CRS was loaded onboard the Coast Guard buoy tender USCGC *Sedge* and transported to Prince William Sound. The *Sedge* and a private long liner fishing vessel towed the open water oil containment and recovery system, but its success was short lived. A weather front went through the Prince William Sound region; and as a result, the oil was spread throughout the sound and absorbed large amounts of floating vegetation and debris, creating oil slicks that had the viscosity of tar.

Although the open water oil containment and recovery system was very successful at containing the heavy oil, the diaphragm pumps on the system would not handle the viscosity of the oil. However, the containment boom element was very successful in containing the heavy oil and holding



ADAPTS pumps used to lighter *Exxon Valdez*. U.S. Coast Guard photo.



The CGC *Sedge* and a private fishing vessel tow the OWO CRS. U.S. Coast Guard photo.

the oil in the severe current conditions. So National Strike Force personnel deployed several OWOCRS, connected the ends of the booms, and anchored them in sheltered locations. The oil was later recovered with pumps that could handle the viscous oil.

This experience is the primary reason the OWOCRS was replaced with the vessel of opportunity skimming system and spilled oil recovery systems that have skimmers fitted with this type of pump.

Shoreline Cleanup Oversight

Although open-water recovery continued until the beginning of May 1989, the focus of operations became shoreline cleanup, which ultimately included six Exxon task forces, each made up of 800 to 1,000 members.

National Strike Force personnel carried out initial monitoring tasks on a USCG cutter, stationed in Prince William Sound. The goal was to have each task force team berthed on a single vessel that would also provide a platform for forward command posts and to keep monitoring teams in the general area of each task force, but separated to some degree from the Exxon task force management and their workforce.

However, the support vessels provided did not meet the one vessel per team criteria. Fortunately, it also became clear that the Exxon task forces could be adequately monitored with smaller USCG teams. However, as the response progressed, the regular Coast Guard personnel, assigned primarily from Marine Safety Offices, were relieved by Coast Guard Reserve personnel who often had no marine environmental protection background and very little small boat experience.

As a result, NSF personnel identified any experience shortcomings and developed training protocols for personnel at

the outset of their assignment to ensure they were aware of the program goals, safety protocols, and other essential information needed to ensure a safe and successful operation.

Pick Your Battles

Early in the response, personnel determined that Prince William Sound shorelines and other impacted locations outside of the sound would not reach a level of final cleanup during the 1989 summer response period. Therefore, the goal was to only treat shorelines to remove potentially mobile oil, so it would not be re-mobilized during the winter.

As one can imagine, there was some disagreement as to this decision and even more as to what constituted "clean." Therefore, federal, state, and Exxon officials developed an environmental committee and created a shoreline segment completion checklist to guide inspectors and agreed that the Exxon workforce could not move to new areas until the segments they were working passed inspection.

Finally, National Strike Force administrative personnel maintained records for the duration of the 1989 response to ensure that Exxon would reimburse the cost of the federal response.

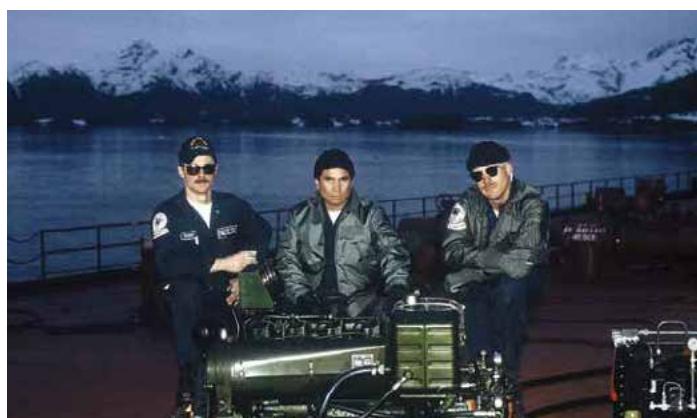
1989-1990 Winter Maintenance and Planning Phase

Due to the extreme weather conditions in Prince William Sound, the unified command agreed that the cleanup would transition from the summer treatment phase to a winter maintenance program in mid-September 1989. This maintenance program consisted primarily of personnel on off-shore supply vessels monitoring the shorelines, and if they were found to be releasing or "bleeding" oil, they provided maintenance as conditions permitted to control the release.

The winter of 1989–1990 was also used to prepare for the 1990 summer cleanup phase, as NSF personnel held meetings with Exxon, National Oceanic and Atmospheric



A view from the bridge of the *Exxon Valdez*. U.S. Coast Guard photo by MK1 Alfredo Valadez.



MK2 Dan Pearcy, MK1 Alfredo Valadez, and BM1 Scott Thayer ready the prime mover. U.S. Coast Guard photo.



Responders receive more NSF equipment. U.S. Coast Guard photo by Coast Guard Public Information Assist Team.

Administration, and State of Alaska representatives. The consensus: The workforce would be smaller, yet much more mobile than the large task forces used in the 1989 summer cleanup.

During this time, the Coast Guard, Exxon, and State of Alaska command centers were all moved from Valdez to Anchorage, which allowed better logistics capability for serving the entire spill area.

In addition, the PST commanding officer was assigned as USCG cleanup manager and one NSF member was assigned to oversee the Prince William Sound workforce. Another National Strike Force member was assigned to the USCG command center in Anchorage to liaison with USCG forward command centers in Seward, Homer, and Kodiak and provide them logistical and tactical cleanup support. Other NSF personnel would be called in as necessary for special projects during the 1990 cleanup season.

1990 Shoreline Cleanup Phase

The 1990 shoreline cleanup phase began in mid-March 1990 with a training program that included the goals and objectives approved during the winter meetings, administrative procedures for developing and approving work orders for the segments to be treated or cleaned during the summer, and the manner in which the work orders would be provided to the land owners of impacted areas for their comment prior to beginning work.

A technical advisory group (TAG), made up of personnel from the U.S. Coast Guard, National Oceanic and Atmospheric Administration, Exxon, and Alaska Department of Environmental Conservation coordinated the effort. The Pacific Strike Team commanding officer also served as the Coast Guard TAG representative.

The technical advisory group reviewed shoreline cleanup assessment team reports and determined if Exxon work

orders met the tactical objectives for the segment. The work orders then went to the land owners for comment. If the land owner had comments, TAG members reviewed the comments and made necessary amendments and forwarded the work orders to the federal on-scene commander.

When not involved in the TAG effort, the Coast Guard cleanup manager was in the field, troubleshooting problem sites and working with Exxon supervisors, Coast Guard and state monitors, and land owners to ensure the work orders were carried out as agreed.

Looking Back to Plan Ahead

Whether someone is a firefighter, police officer, or search and rescue crew member, all professional responders train and focus their lives on their given response specialty. Even though these specialists do not want harm to come to the public or the environment from disastrous events, there is another part of their makeup that pines for them, so they can use the expertise they have developed. National Strike Force members are no exception.

The responses to the marine casualties that occurred during 1988 to 1990 were a NSF member's nirvana. The *Exxon Valdez* spill, as well as other marine casualty events, kept the entire National Strike Force cadre on the road almost permanently.

While this was difficult for the crew and their families, we doubt if any of them would want to have missed it. And, in recognition, the Pacific Strike Team crew was named Pacific Area Operational Unit of the Year and later Coast Guard Operational Unit of the Year for their response activities during the *Exxon Valdez* spill and other incidents during 1989 and 1990.

About the authors:

Retired CDR Gary Reiter was commanding officer of the Pacific Area Strike Team from 1987 to 1990. Since his retirement from the Coast Guard, he has worked as a qualified individual and spill manager with an oil company and three response and planning consulting firms. He is president of Westcliffe Environmental Management Inc., a consulting firm that specializes in oil spill response, training, and planning.

Retired CAPT Glenn Wiltshire was commanding officer of the Atlantic Area Strike Team from 1988 to 1991. Today he serves as the deputy port director for Port Everglades in South Florida.

Retired LCDR Jack Kemerer was executive officer of the Pacific Area Strike Team from 1988 to 1991. After retiring from active duty, he worked in the private sector providing emergency response planning and training services. Subsequently, he returned to federal service with the Coast Guard and is currently chief of the Fishing Vessel Division within the Office of Commercial Vessel Compliance at Coast Guard headquarters.

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National Strike Force Oversight

Ensuring marine salvage and commercial diving operation safety.

by MR. JIM ELLIOTT
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T&T Marine Salvage Inc.

Throughout its 40-year history, the National Strike Force has been called upon to oversee and support salvage and diving operations, from the *Exxon Valdez* response to managing hundreds of marine salvage operations, including the Hurricane Katrina recovery effort.

Of course the number-one priority for a Coast Guard responder is to ensure safe operations and that the federal on-scene coordinator has the authority to take immediate corrective action to prevent injury and loss of life.

Heavy Lift and Rigging

Heavy lift and rigging play a major role in almost every salvage operation. A Coast Guard responder should ensure equipment and personnel are certified for the specific lifting operation and, if the heavy lift asset is an inspected vessel, the Coast Guard responder should ensure regulatory compliance in accordance with the certificate of inspection.¹

Additionally, Coast Guard personnel should evaluate rigging for material condition, breaking strength, and a safety factor. Wire rope and synthetic slings, for example, have manufacturer ratings based on configuration—vertical sling, choker, and basket. As with any other engineering system, personnel should apply the appropriate factor of safety to the breaking strength—typically 4:1 or better and the weak link should be the calculated limiting factor. For example, wire end fittings, pad eyes, brackets, and shackles may reduce the capacity of the rigging system.

In addition to evaluating the heavy lift assets and rigging, a Coast Guard responder should review the actual heavy lift plan and include the weight of the rigging and crane block, the vessel, fuel, cargo, gear, and everything onboard in the calculation to ensure the crane can safely lift the vessel.



Post-hurricane response salvage and heavy lift operation. Photos courtesy of T&T Marine Salvage.



Mobile offshore drilling unit salvage.



Safety Recommendations for Incident Commanders

- ✓ Immediately activate the vessel response plan to initiate actions by a professional salvor that meets the Coast Guard's salvage and marine firefighting regulations.
- ✓ Request National Strike Force and Salvage Engineering Response Team leadership to integrate into the unified command and provide technical oversight.
- ✓ Base operational safety requirements on regulatory and industry standards.
- ✓ Conduct a job hazard analysis to mitigate risks prior to commencing operations.
- ✓ Design the incident command organizational structure to facilitate effective communications during time-critical salvage operations.

Environmental conditions and weather may also act as limiting factors. For example, an increase in sea state may increase dynamic loading and the wind speed may exceed the crane's operational parameters.

The same basic rules apply for lifting a hydraulic power unit from the dock to a barge, as lifting an entire vessel. In sum, you need the right equipment, rigging, and personnel. An independent safety officer who participates in a pre-lift job hazard analysis will also pay dividends.

Emergency Lightering

Grounding salvage often involves lightering cargo and fuel to reduce ground reaction, remove a potential pollutant, to remove weight from the vessel, and to save the cargo. While it is preferred to lighter liquid cargoes ship to ship, salvors must be prepared to conduct "over the top" transfer procedures using hydraulic submersible pumps. In fact, U.S. Coast Guard regulations now require emergency lightering to



Emergency lightering operation.

commence within 18 hours near shore and within 24 hours offshore.² Note, the largest cargo tank must then be lightered continuously within the first 24 hours—this includes coordinating a receiving vessel, mooring equipment, and fenders, in addition to the lightering package. As a result, many salvors maintain pre-positioned lightering packages around the U.S. to meet these stringent planning timelines.

For the Coast Guard responder, regulatory standards and industry guidelines support on-site safety efforts. For example, the declaration of inspection regulatory standards apply to emergency transfer operations. For offshore lightering operations, the Oil Companies International Marine Forum and Industry Task Force on Offshore Lightering guidelines are based on lessons learned from multiple ship-to-ship operations and will also prove valuable during emergency operations.

The National Strike Force has conducted and managed multiple emergency lightering operations in myriad operational environments and lessons learned from these events helped improve equipment design and procedures. For example, difficulties encountered in attempts to lighter viscous oil was the impetus to develop a viscous oil pumping system that includes a water injection system to reduce head pressure and increase pumping distances.

Commercial Diving Operations

Diving operations, especially during a dynamic, time-critical marine salvage response, are inherently hazardous, so diver safety is a priority during every salvage operation. Prior to commencing operations in the U.S., those charged with oversight should inspect the commercial diving operation in accordance with applicable Coast Guard and Occupational Safety and Health Administration regulations.

For example, when diving in contaminated waters or in an area where there is a substantial threat of discharge of



Tug and barge fire.

oil or hazardous materials, commercial divers must meet 29 CFR 1910.120 training and operational requirement standards.³ Additionally, the National Oceanic and Atmospheric Administration (NOAA) states SCUBA diving is not appropriate where there is a risk of oil or toxic chemical ingestion.⁴ For contaminated water diving, the National Research Council, U.S. Environmental Protection Agency, NOAA, the Association of Diving Contractors International, and International Marine Contractors Association have published guidance and protocols.⁵

Emergency Towing

The Coast Guard's salvage regulations require applicable vessel owners and operators to ensure emergency towing vessels have the proper characteristics, horsepower, and bollard pull to tow their vessels in any condition of loading, and are also capable of operating in winds up to 40 knots.

Like the rigging inspections and standards discussed earlier, personnel should thoroughly inspect emergency towing gear prior to operations and incorporate a reasonable margin of safety into the calculation. It should be noted, load cells, correctly installed and calibrated, are the only way to accurately measure the tension in a towing system.

Stranding salvage often involves refloat attempts with towing vessels and ground tackle. Again, responders should measure stresses on the system to prevent a catastrophic failure.

Marine Firefighting

In the case of an onboard fire, after the ship's crew has exhausted attempts to control the fire, it will fall to the professional salvor to lead onboard marine firefighting operations. The Coast Guard's salvage and marine firefighting regulations define expected marine firefighting response timelines for vessels at the pier, near shore, and offshore. A professional salvor can not only bring external firefighting systems and teams, salvors can also bring dewatering pumps, a working knowledge of shipboard systems, and naval architects to analyze the ship's stability and structural integrity.

Without the comprehensive suite of maritime services provided by a professional salvor, the end result of a marine firefighting response is often inadequate and costly, in both safety and property. In sum, for high-risk marine firefighting incidents, professional salvors should be activated immediately and Coast Guard incident commanders should call upon the NSF and the Coast Guard Marine Safety Center Salvage Engineering Response Team to support assessment and response efforts.

Command and Control

National Strike Force members have served in leadership positions during many of the nation's largest and most high-profile incidents. Experts in the Incident Command System, members have managed operations during numerous salvage and subsea operations.

Regarding salvage and marine firefighting operations, since marine casualty operations often require time-critical decisions, the unified command should work directly with the salvor during the initial stages of the response operation to ensure alignment on initial actions. Issues can arise when the salvor is positioned below an operations section chief who has little to no marine casualty response experience, which is more often than not in today's all-hazard response world.

Ongoing Training

Finally, to prepare for salvage and marine firefighting operations, Coast Guard responders should consider attending additional training, such as the American Salvage Association's salvage course. Members of the American Salvage Association also offer industry training programs for individual Coast Guard members. Additionally, area committees should establish a salvage and marine firefighting workgroup to coordinate training, exercises, and conceptual incident action plans for future operations.

About the author:

Mr. Jim Elliott served previously as a National Strike Force response officer. Today, he is responsible for managing worldwide salvage and emergency response operations for T&T Salvage, and he is also a Type 1 incident commander and federal on-scene coordinator. Mr. Elliott holds a B.S. in environment management, a master of environmental policy, and an M.A. in national security and strategic studies.

Endnotes:

¹ While many crane and derrick barges are "uninspected" or do not require a COI, it should be noted these floating assets are regulated under the Occupational Safety and Health Administration (OSHA). For example, 29 CFR 1926.1437, provides a list of requirements for pre-use, monthly, annual, and quadrennial inspection requirements for floating crane and derricks. For example, the lifting assets should have certificates for annual inspections and there should be records of these various inspections, including survey reports of the internal barge inspections required every four years for Coast Guard "uninspected" barges.

² Federal Register, Department of Homeland Security, Coast Guard 33 CFR 155 Salvage and Marine Firefighting Requirements; Vessel Response Plans for Oil; Final Rule; December 31, 2008, and Federal Register, Department of Homeland Security, 33 CFR 151, 155, and 160; Nontank Vessel Response Plans and Other Response Plan Requirements; Final Rule, 2013.

³ Occupational Safety and Health Administration. *Commercial Diving Regulations (29 CFR Subpart T); Hazardous Waste Operations and Emergency Response (29 CFR 1910.120); and Training Marine Oil Spill Response Workers under OSHA's Hazardous Waste Operations and Emergency Response Standards*. OSHA 3172, 2001.

⁴ NOAA Diving Manual: *Diving for Science and Technology*. U.S. National Oceanic and Atmospheric Administration, 4th Edition, Revised, September 1, 2010.

⁵ National Research Council. *Spills of Nonfloating Oils: Risk and Response*, National Academy Press, Washington, D.C., 1999. Association of Diving Contractor International. *Consensus Standards for Commercial Diving Operation*; Sixth Edition revised, 2014. International Marine Contractors Association, *Diving in Contaminated Waters*, IMCA D 021.



SMART Monitoring Protocol

The on-scene coordinator's tool for success.

by LT FRANK KULESA

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MASTER CHIEF MARINE SCIENCE TECHNICIAN ANDREW JAEGER

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In the late evening hours of April 20, 2010, the *Deepwater Horizon* oil rig exploded, killing 11 crew members and setting in motion a catastrophic series of events that would result in the worst environmental disaster in U.S. history and one of the largest response organizations ever assembled.¹ In this incident, declared the first-ever spill of national significance, responders relied heavily upon applied technologies to combat the crude oil released from the wellhead.

The scope and frequency of chemical dispersant applications and *in-situ* burning operations reached a level never before imagined. The unified command faced tremendous challenges trying to effectively mitigate the effects of this spill, while ensuring response personnel safety.

The Special Monitoring of Applied Response Technologies (SMART) guidelines provided the on-scene coordinator (OSC)—the federal official charged with coordinating and directing removal actions—with the consistent, real-time, and scientifically based data necessary to make informed operational decisions.

One of the OSC's most critical decisions is determining appropriate response strategies. At its peak, the *Deepwater Horizon* incident involved more than 48,000 responders assigned to incident command posts throughout the Gulf Coast states.²

Special Monitoring of Applied Response Technologies

Representatives from the U.S. Coast Guard, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and the Centers for Disease Control and Prevention, originally developed the Special Monitoring of Applied Response Technologies guidelines in 1997, which have evolved to include advances in dispersant and *in-situ* burning response methodologies, technologies, and monitoring equipment.

The guidelines provide standardized monitoring procedures, observer checklists, command and control structures, equipment lists, and training outlines used in preparation for and response to oil spills. Additionally, SMART guidelines employ common terminology and adhere to Incident Command System principles, to integrate personnel and resources from diverse federal, state, local, and private sector organizations.

While the guidelines have historically been utilized during oil spills, they can be adapted for hazardous substance releases, particularly incidents that require particulate air



Coast Guard Marine Science Technician Chief Stephan Brown observes an *in-situ* burn operation during *Deepwater Horizon* response. U.S. Coast Guard photo by Chief Petty Officer Robert Schrader.

SMART Limits

Though the SMART guidelines provide the on-scene coordinator with an excellent planning and decision-making framework, they are not all-encompassing. Operational planners should consider the following assumptions and limitations before and during significant oil spills:

- 1 Tier I—Visual Observation:** Trained observers provide qualitative assessments regarding dispersant effectiveness. Observers may enhance visual observation with electronic sensory instruments.
- 2 Tier II—On-Water Efficacy Monitoring:** Teams equipped with real-time water monitoring devices and sampling equipment collect on-site quantitative dispersed oil data.
- 3 Tier III—Additional Monitoring:** Tier III monitoring employs a variety of techniques (including monitoring at multiple depths and increased water sampling) to determine dispersed oil plume movement.

In-Situ Burning Operations

SMART *in-situ* burning monitoring provides data regarding potential health concerns associated with burning oil. Monitoring teams use real-time particulate air monitoring equipment in areas where

- 1 SMART guidelines do not directly address responder and monitoring personnel health and safety.** The OSC and unified command must develop a health and safety plan, as required by OSHA regulations, which accounts for incident-specific risks, including those arising from dispersant and *in-situ* burn operations.
- 2 The guidelines do not provide complete training on specific monitoring technology.** Government agencies and private sector organizations must develop tailored training programs based on their respective authorities, responsibilities, equipment, and techniques to ensure they maintain a robust cadre of trained response personnel.
- 3 While SMART guidelines can help determine dispersant application efficacy, the decision to use them will always rely on informed environmental trade-offs and continuous stakeholder engagement.**
- 4 SMART guidelines are not regulatory requirements.** They can be expanded or adapted, based on incident magnitude, severity, and constraints. While responders should make every effort to implement the protocols, *in-situ* burning or dispersant applications should not be delayed to allow SMART monitoring team deployment.

SMART Special Teams

The National Response System prescribes several special teams the OSC can call upon to assist with SMART guidelines implementation during dispersant and *in-situ* burning operations.

National Oceanic and Atmospheric Administration Scientific Support Coordinator

The response on-scene coordinator may designate the National Oceanic and Atmospheric Administration scientific support coordinator (SSC) as the principal advisor for all scientific issues.

NOAA SSCs directly support the OSC and unified command to implement SMART monitoring protocols. They review monitoring data to determine dispersant and *in-situ* burn operation efficacy, which informs operational decisions regarding their employment and continued use.

In addition to their individual expertise in oil and hazardous substance response, SSCs provide a single point of contact for NOAA's vast network of scientific and environmental experts.

National Strike Force

The National Strike Force is the Coast Guard's operational asset to employ SMART protocols. Strike team personnel are oil and hazardous substance response experts with the specialized training and a robust suite of response equipment necessary to implement all tiers of dispersant and *in-situ* burn monitoring.

OSCs should consider NSF resources and capabilities when developing dispersant and *in-situ* burn plans and should immediately request strike team assistance if

they anticipate the potential for these operations.

Public Information Assist Team

As demonstrated during the *Deepwater Horizon* incident, an effective strategic messaging and engagement strategy is absolutely vital to a successful response. The Coast Guard Public Information Assist Team (PIAT) is comprised of highly skilled public affairs specialists who can assist the OSC to develop a comprehensive public affairs strategy.

PIAT members perform a wide array of services during an oil spill response, including serving as the unified command's public information officer (PIO), maintaining a joint information center, producing public information products, and coordinating with other agency PIOs and media outlets.

A New Era for Applied Response Technologies?

America's Energy Renaissance

The U.S. is in the midst of a 21st century energy renaissance. Domestic oil production has increased dramatically from 5 million barrels per day in 2008 to 7.45 million barrels per day in 2013, with projected estimates of 9 million barrels per day in 2015.¹ Additionally, offshore drilling continues to move into deeper waters and more remote areas, including the Arctic.

Despite billions of dollars in transportation infrastructure investment, America's pipeline network is nearing capacity. As a result, rail shipment has become a preferred transportation method for domestic crude oil.

Moreover, oils such as Bakken crude and Canadian oil tar sands present unique response challenges and health and safety hazards. Collectively, these production and transportation changes have the potential to dramatically

increase the risk of major environmental incidents.

As this risk increases, operational planners must evaluate dispersants and *in-situ* burning to combat the new threats of our energy renaissance.

Atypical Dispersant Operations

Additionally, the protracted nature of the *Deepwater Horizon* oil spill response presented enormous challenges with regard to applied response technologies, specifically dispersant usage. While the existing SMART guidelines provided a strong foundation to monitor dispersant efficacy, it was clear that a more robust framework was needed to account for "atypical" dispersant use.

Environmental Monitoring for Atypical Dispersant Operations

Recognizing these unprecedented circumstances and the potential challenges in future uncontrolled discharges, the U.S. National Response Team

developed Environmental Monitoring for Atypical Dispersant Operations guidelines, to assist unified command personnel during two unique dispersant application situations.

1 Subsea application, which generally applies to the subsurface ocean environment, focusing particularly on operations below 300 meters.

2 Prolonged surface application, which generally applies to dispersant application that extends beyond 96 hours.

The Environmental Monitoring for Atypical Dispersant Operations guidelines expand on existing SMART program equipment and methods and recommends key indicators that aid decision makers in determining the fate and concentrations of dispersed oil in the water column.

Endnote:

¹ U.S. Energy Information Administration.

the smoke may impact worker populations or the public. The unified command uses this information to terminate *in-situ* burning operations that present a public health hazard.³



Coast Guard Ensign Adam Mosley prepares a hydrolab to assist scientists in determining the effectiveness of dispersants applied during the *Deepwater Horizon* response. U.S. Coast Guard photo by Petty Officer Luke Pinneo.

SMART and Deepwater Horizon

During the *Deepwater Horizon* incident, responders:

- conducted 411 *in-situ* burning operations, burning 246,405 barrels of oil (5 percent total spill volume);
- applied approximately 1 million gallons of dispersants to the surface and an additional 770,000 gallons at the wellhead, chemically dispersing 394,248 barrels of oil (8 percent total spill volume).⁴

Like all oil spills, the *Deepwater Horizon* response faced its share of challenges and the dispersant and *in-situ* burning operations were no exception. Preauthorization plans had not envisioned operations of this magnitude or protracted nature, which required the unified command to develop and continually refine new response plans.

Fortunately, National Strike Force (NSF) personnel provided expertise in air monitoring, contractor oversight, and site safety, which allowed Incident Command System teams to quickly transcend a multitude of challenges. Furthermore, the NSF cadre of qualified reservists provided a much-needed surge capacity to support SMART operations.

Preparing for the Next Deepwater Horizon

The whole-of-government response to this event was ultimately successful. Nonetheless, the incident stressed the National Response System to levels never before seen. It is imperative that individual lessons observed during *Deepwater Horizon* become organizational lessons learned to ensure the oil spill response community is collectively prepared for the next spill of national significance.

Recommendations include:

- **Planning:** Responders should evaluate regional and area contingency plans for accuracy and adequacy, placing specific emphasis on developing or updating geographic response plans and dispersant/*in-situ* burning preauthorizations.
- **Training:** OSCs should engage the National Strike Force, National Oceanic and Atmospheric Administration scientific support coordinators, and industry partners to conduct joint training on all aspects of dispersant and *in-situ* burning operations.
- **Exercises:** OSCs should partner with industry and spill management teams to develop area and industry exercises with objectives and scenarios that incorporate applied response technologies to thoroughly test regional contingency plans, area contingency plans, preauthorization plans, and equipment deployment procedures.
- **Consultation:** On-scene coordinators should continuously engage with their respective trustees and managers during area committee meetings and consult with them to develop response operation preauthorization plans.
- **Resource capabilities:** OSCs should evaluate and account for response equipment resources within their area of responsibility, particularly those resources needed for dispersant applications and *in-situ* burning. Specifically, the on-scene coordinator should examine area contingency plan capabilities, limitations, and operating parameters.

The magnitude and challenges of the *Deepwater Horizon* oil spill sparked a renewed interest in applied response technologies and reinvigorated research and development and policy initiatives. Additionally, domestic oil production growth has increased the risk of major oil spills, which may increase the demand for dispersants and *in-situ* burning during future incidents.



The crew of a Basler BT-67 fixed-wing aircraft applies dispersants to an oil slick during the *Deepwater Horizon* response. U.S. Coast Guard photo by Petty Officer Stephen Lehmann.

Fortunately, with advanced planning, training, and consultation, utilizing dispersants and *in-situ* burning will remain viable methods to combat oil spills.

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Master Chief Jaeger is the reserve command master chief at Coast Guard Sector Northern New England, with 24 years of service. His previous assignments include response supervisor at the Atlantic and Gulf Strike Teams. He has 15 years of experience as a firefighter for the city of Oshkosh, Wisconsin, and as a state fire service instructor specializing in hazardous materials response.

Endnotes:

¹ BP *Deepwater Horizon* Oil Spill Incident Specific Preparedness Review (ISPR), Final Report, 2011.

² Ibid.

³ SMART protocol follows the NRT recommendation of a time-weighted average of 150 micrograms of particles with a diameter of 10 micrometers or less (PM-10) per cubic meter of air.

⁴ BP ISPR.

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Beyond Augmentation

Specialized forces in the Texas City "Y" spill response.

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On March 22, 2014, a 585-foot bulk carrier and an oil barge collided where the Texas City Channel, the Intracoastal Waterway, and the Houston Ship Channel converge.¹ Locals call this area the "Texas City Y," since the deep-draft Texas City Channel branches off from the Houston Ship Channel, forming a "Y" shape.

As the federal on-scene coordinator and leadership team overseeing the spill response, we were faced with managing

an approximate 4,000-barrel spill of heavy fuel oil from the bulk carrier and a potential 40,000-barrel spill from the barge. During the next few weeks, the operation quickly grew into a large-scale, multi-agency response, with oil from the spill affecting more than 60 miles of shoreline. We stood up two incident command posts, multiple staging areas, and an area command. Responders deployed nearly 40 miles of protective boom, skimmed more than 400,000 gallons (approximately 9,500 barrels) of oil/water mixture, removed oil from dozens of miles of shoreline, disposed of millions of pounds of oiled waste, and decontaminated approximately 300 vessels.²

More than 5,000 personnel were involved at the height of the response, including personnel from the responsible parties, numerous oil spill removal organizations, as well as federal, state, and local agency representatives.³

Standing on the Shoulders of Giants

Fortunately, we were able to quickly clean the oil-impacted shorelines, and the response entered into a "monitor and maintenance" phase by the middle of April. While we will document response successes and lessons learned in our report to the National Response Team, we attribute the speed and success with which this spill was resolved to several factors.



Damage to the barge's hull. U.S. Coast Guard photo by LT Mehai Leta.

First and foremost were the men and women who worked on this spill; but they didn't do it alone—we all drew on the lessons learned from those who had gone before us. Nearly 18 years ago, in a strikingly similar oil spill, a bunker barge cracked in rough seas at the Texas City Y, discharging 3,000 barrels of oil.⁴

Fortunately, our predecessors captured that work in the Central Texas Area Contingency Plan. Additionally, Marine Safety Unit Texas City exercised a similar scenario in March 2012, and, as luck would have it, some of those who had worked the 1996 spill were present at the recent incident. With a relevant plan and experienced partners, we were ready for this spill in most conventional ways.

Deployable Specialized Forces

Of course, major oil spills are hardly "conventional" operations for most Coast Guard units.

Fortunately, we can draw on the Coast Guard's deployable specialized forces (DSFs), which are rapidly deployable technical experts with specialized equipment and advanced incident management capabilities. These forces go "beyond augmentation," since they fully integrate within the response structure, provide continuity throughout the response, and serve fluidly in a broad array of roles.

Coast Guard DSFs include:

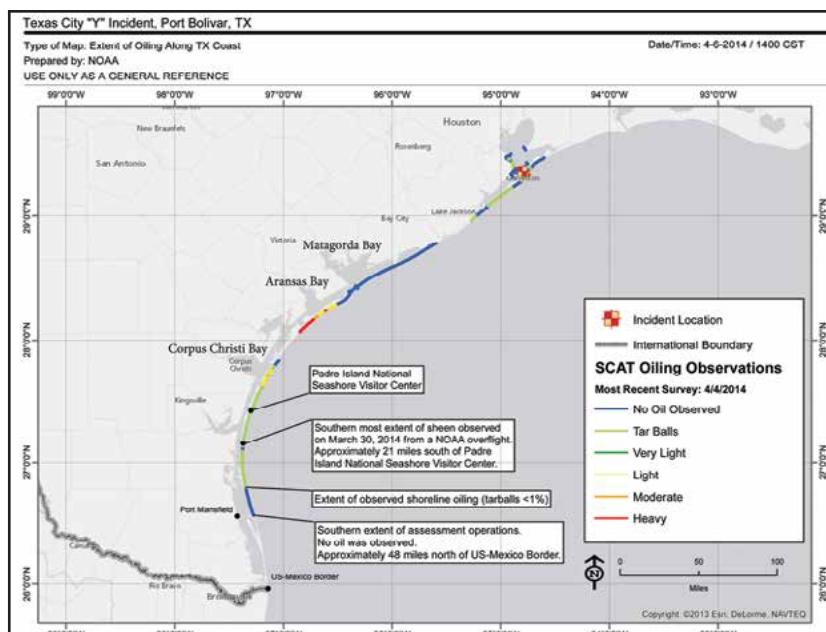
- the National Strike Force,
- the Public Information Assist Team,
- the Incident Management Assistance Team.

A Lot of Help From Our Friends

Other federal agency personnel also provided important capability in this response, including the National Oceanographic and Atmospheric Administration's scientific support coordinators and Environmental Response Management Application (ERMA) support team.⁵

Many local resources are also invaluable response partners. For example, for the recent response, we used personnel from the Texas Commission on Environmental Quality to conduct air, sediment, and water sampling and monitoring. This allowed National Strike Force personnel to focus on monitoring vessel decontamination activities.

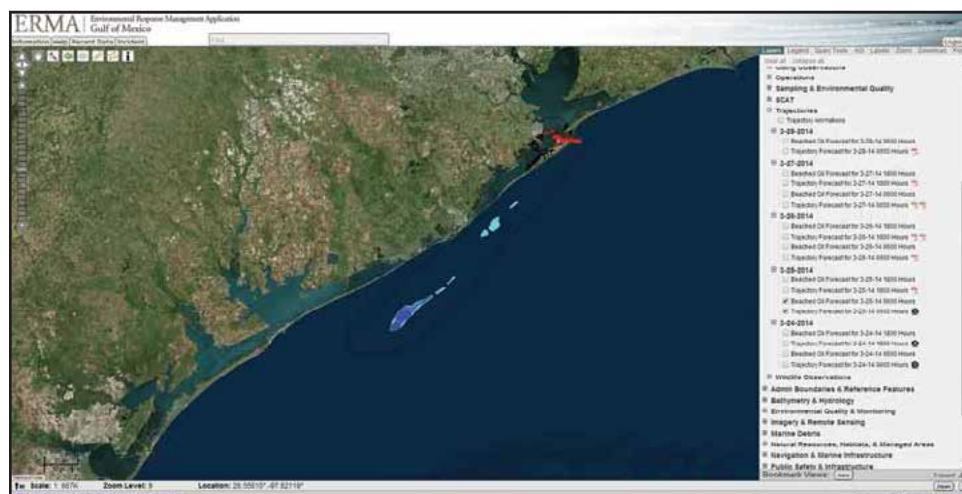
We used ERMA personnel to capture and distribute trajectories for the



NOAA extent of oiling map details heavy, moderate, light, and very light impact along the Texas shore, including the Galveston Bay. Image courtesy of NOAA's Office of Response and Restoration, Emergency Response Division.

oil and we placed skimmers and diversion boom in those locations. As a result, skimmers sat three-abreast in the Galveston jetties as a weather front swept part of the initial slick out to sea—and into their path. A day later, we used the further trajectory to place skimmers offshore, dead-center of that slick, as it moved down the coast.

Further, NOAA SSCs deployed to support us, including their contractors with shoreline cleanup and assessment technique (SCAT) expertise. In offshore island areas, where storms buried stranded oil, we quickly recognized the need to extend our SCAT teams. To our relief, DSF responders integrated into and rounded out the SCAT teams, greatly increasing their reach and allowing the teams to cover far more ground.



NOAA trajectory, including offshore oil concentration. Image courtesy of NOAA's Office of Response and Restoration, Emergency Response Division.



Finally, as the response grew, the data sharing became more complex. To meet this challenge, the ERMA support team developed a detailed data sharing agreement that specified how data would be provided and ensured a consistent common operating picture. We anticipate this will serve as a template to coordinate data sharing for future responses.

The Take-Aways

The deployable specialized forces provide a tremendous return on investment for the public and proved their value during the Texas City Y spill, which grew into a whole-of-government response.

As response veterans, it is our duty and prerogative to give advice to those who will come after us. So, listen up:

- use the right tool for the job,
- embrace the science,
- focus on unity of effort,
- use living job aids,
- plan continuity in leadership,
- fix non-traditional problems non-traditionally.

What do we mean by this? We feel that these are some of the keys to a successful response, and you can achieve all of them if you rely on your force multipliers—especially the DSFs.

We've already touched on the first two bullet points (use the right tool, embrace the science), as, in this response, we were quick to call on Coast Guard and other agencies' specialized forces. Most importantly, we let them do what they do best, and we listened to their advice to carry out this response.

Focus on Unity of Effort

As a result of our strong pre-need relationships, staff from areas that were not directly affected surged to assist in this response. Fortunately, DSF personnel are particularly skilled in working with diverse partners and in bridging cultures.



Coast Guard personnel, along with other federal, state, local, and contract incident managers work with the responsible party in the incident command post. U.S. Coast Guard photo by Petty Officer Andrew Kendrick.

In this response, this was particularly evident in the joint information center, where our Public Information Assist Team information officer provided strong leadership to assist with the tough decisions the information center staff faced, as the incident escalated and national media increasingly engaged.

Use Living Job Aids

We knew early on that the Texas City Y spill was going to become a Type 1 event. The Federal Emergency Management Agency categorizes incidents into five types based on complexity. Type 5 incidents are the least complex and Type 1 the most complex. As we surveyed our interagency and mixed public/private sector team, we quickly realized that some folks could use help. After all, they had been yanked from commercial industry day jobs and were facing the enormous challenges that come with a Type 1 incident. The quick and easy answer: Assign them a savvy DSF "coach" as a deputy or assistant.

During this response, members of all three strike teams and the Incident Management Assistance Team easily embedded into field teams, forward command posts, and incident command posts (ICPs), providing invaluable management expertise.

Plan Continuity in Leadership

With any incident, succession to leadership is important, and we all know that demobilization planning starts the moment that resource reports. We relied on three key DSF personnel: CDR Joe Leonard, CDR Keith Donohue, and CDR Kevin Lynn. As veterans of major Gulf of Mexico spills, they brought experience to this response.

Whether they were DSF or organic forces, we found that we needed to identify our experienced people, rest and recharge them, and groom them to fleet up into leadership positions.

Fix Non-Traditional Problems Non-Traditionally

The National Contingency Plan outlines our response priorities clearly: protect life and ensure safety.⁶ Traditionally, this has been seen as controlling immediate toxicity hazards.



Massive logistics in remote reaches illustrate the scale of a Type 1 incident response. U.S. Coast Guard photo by CAPT Randal Ogrydziak.



National Strike Force personnel advise on logistics and field operations in a remote response area. U.S. Coast Guard photo by Petty Officer Andrew Kendrick.

During the Texas City Y Spill response, however, a number of problems arose that clearly fit under this life/safety priority, but were fairly non-traditional because they overlapped into larger public health and food safety concerns. For example, where we considered “lift-and-float” surface washing agents, problems of water quality sampling, baseline, and more arose.

The NOAA SSCs advised us on these critical issues and more, including oil removal techniques, dispersant use effectiveness, marine wildlife impact, water and air quality analysis, and sensitive resources. The list goes on.

With their help, we convened a coalition of non-traditional partners in the health and seafood safety communities to analyze the threat, recommend public protective measures, and resolve the problem.

There is no “I” in Team

As we have noted, we relied on many partners to bring their specialized expertise to this response. One final group that deserves mention—the reservists. Primed with experience from *Deepwater Horizon* and other incidents, reservists from local units were readily available and offered unique capabilities and continuity for the full length of the response.

For instance, when faced with a challenging issue, we were able to turn to two reservists (NASA and DOJ program analysts) to sort out the data. At the peak, a total of 54 reservists from various units served at all levels and locations, substantially reinforcing our teams.

Finally, as the cleanup progressed toward a maintenance and monitor phase, while the incident was still classified as a Type 1 response, the active duty members at ICP Galveston were able to return to their normal duties and the reserves led the remainder of the response with our unified



Shoveling buried oil on Matagorda Island. U.S. Coast Guard photo by CAPT Randal Ogrydziak.

command partners. This ensured response excellence from start to finish.

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CAPT Lisa Campbell is the senior reserve officer for the Fifth Coast Guard District, and served as the senior reserve officer at Sector Houston-Galveston during the oil spill.

CDR Ricardo Alonso is the commanding officer of Marine Safety Unit Texas City.

CDR Kevin Lynn is the Gulf Strike Team commanding officer.

CDR Zeita Merchant is the special assistant to the Vice Commandant of the United State Coast Guard, and served as the executive officer at Marine Safety Unit Texas City during the oil spill.

LCDR Valery Boyd is the commanding officer of Military Entrance Processing Station Miami, Florida. She was the chief of response at Marine Safety Unit Texas City during the oil spill.

Endnotes:

1. Because formal investigations are pending, this article focuses on the response.

2. Texas City “Y” Spill Response Unified Command Documentation Archive.

3. Agencies included the U.S. Fish and Wildlife Service, the Environmental Protection Administration, the National Oceanographic and Atmospheric Administration, Texas General Land Office, Texas Parks and Wildlife, Texas Department of Public Safety, Texas Commission on Environmental Quality, Galveston County, Brazoria County, Matagorda County, Calhoun County, Harris County, the City of Galveston, Texas City, and the Galveston Beach Patrol.

4. Capt. Kevin J. Eldridge, Lt. Joseph J. Leonard, Jr., Comdr. Dean W. Kutz, and Ltjg Monica L. Rochester (1997). *Tank Barge Buffalo 292: A Unified Response*. International Oil Spill Conference Proceedings: April 1997, Vol. 1997.

5. See Title 40 Code of Federal Regulations part 300.145, Special Teams and other assistance available to the OSCs/RPMs.

6. See Title 40 Code of Federal Regulations, part 300.310, Phase III—Containment, countermeasures, cleanup, and disposal; and Title 40 Code of Federal Regulations, part 300.317, National response priorities.



Between the Spills

NOAA's efforts to mitigate coastal hazards.

by MR. DOUG HELTON
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No matter the size or location, oil and chemical spills can affect human and environmental health. In almost 40 years of responding to spills, the National Oceanic and Atmospheric Administration (NOAA) has provided scientific support for nearly 3,000 marine and inland oil and chemical spills, including many major international spills.

Working with the U.S. Coast Guard (USCG) and other federal, state, and local government agencies, NOAA scientists continue to respond, clean up, and restore the environment after oil and chemical spills.

The unique and often harsh environment found in the coastal village of Wainwright, Alaska, illustrates the challenges of conducting oil spill response and environmental restoration in the Arctic. Photo courtesy of the National Oceanic Atmospheric Administration.



Two halves of the tanker SS Argo Merchant swirl in a sea of foam before sinking. The tanker broke into two pieces after running aground. Photo courtesy of the Coast Guard Historian's Office.

NOAA's scientific support role began with a major spill off the New England coast. On Dec. 15, 1976, the tanker *Argo Merchant* ran aground on Nantucket Shoals and eventually broke in half, spilling its entire cargo of 7.7 million gallons of heavy fuel oil and threatening damage to the region's productive fishing grounds.¹

Earlier that year, NOAA had established the spilled oil research team to study the effects of oil and gas exploration in Alaska. This team was a network of coastal geologists, marine biologists, chemists, and oceanographers that deployed to spills to investigate oil spill impact. Before this, National Oceanic and Atmospheric Administration scientists focused on research rather than spill support.

That focus shifted, however, when the storm-struck *Argo Merchant* ran aground.

NOAA's Emergency Response Division

Building Better Capabilities for Response

Throughout the year, Emergency Response Division (ERD) responders and scientists conduct research and development projects that will better prepare the United States for the future, including:

- decision-making regarding dispersant use,
- preparing for the challenges of a major spill in the Arctic,
- emerging risks in the transport of oil sands and other oils,
- improving models for oil transport and weathering.

Researching Oil Dispersant Use

The unprecedented use of chemical dispersants during the *Deepwater Horizon* oil spill raised questions about their effectiveness and potential environmental consequences. ERD partnered with the University of New Hampshire to develop a worldwide quantitative database of the toxicological effects of dispersants and chemically dispersed oil, conduct research to improve understanding of chronic impacts of chemical dispersant and chemically dispersed oil on blue crabs, and research public

concerns and improve risk communication tools for oil spills and dispersants.

Planning for the Arctic's Challenges

Ongoing and accelerated changes in the Arctic, including the increasing seasonal loss of sea ice, have opened large areas of the Arctic for navigation and commerce and created new opportunities for transportation and resource extraction—bringing resultant risk for accidents, spills, and other environmental hazards.

NOAA's personnel increased efforts to ensure that emergency response, damage assessment, restoration, and marine debris impact research and mitigation, can be accomplished in the Arctic. These efforts included additional staffing in Alaska, participation in the U.S. delegation to the Arctic Council, and strategic planning to identify critical gaps in the ability to be effective in this unique environment.

Examining Oil Sands and Changing Oil Transportation Patterns

Increased production and transportation of oil sands products from Alberta, Canada, are dramatically changing the North American energy portfolio and

receiving intense international scrutiny. In 2013, ERD collaborated with the University of Washington to define the risks the spill response community faces with the burgeoning transport of oil sands.

The partners also examined the response implications of the rapid growth of oil production in new oil fields in North Dakota and Montana.

Improving Oceanographic and Atmospheric Transport Models

NOAA uses the General NOAA Operational Modeling Environment (or GNOME) to predict the possible route, or trajectory, a pollutant might follow in a body of water. In addition, ERD developers and oceanographers have developed an online tool (the GNOME Online Oceanographic Data Server, or GOODS) to allow users to download files needed to run GNOME, base maps, and publicly available ocean current and wind information.

NOAA's air dispersion model, Areal Locations of Hazardous Atmospheres, has also been updated and enhanced to better estimate how toxic chemical clouds travel.

The USCG was inundated with competing and often conflicting scientific requests and recommendations from the many nearby research institutions and from other federal and state agencies. That advice varied on fundamental points regarding the fate of the oil, response alternatives, and potential impact to the natural resources. So USCG responders asked the spilled oil research team to act as scientific advisers.

Formalizing Scientific Support

This informal science support proved invaluable, and the USCG and its National Strike Force began to rely on the team to coordinate the complex scientific issues that arose at spills. In 1977, NOAA formally established a scientific support team to provide emergency spill response assistance to the Coast Guard and the Environmental Protection Agency (EPA).

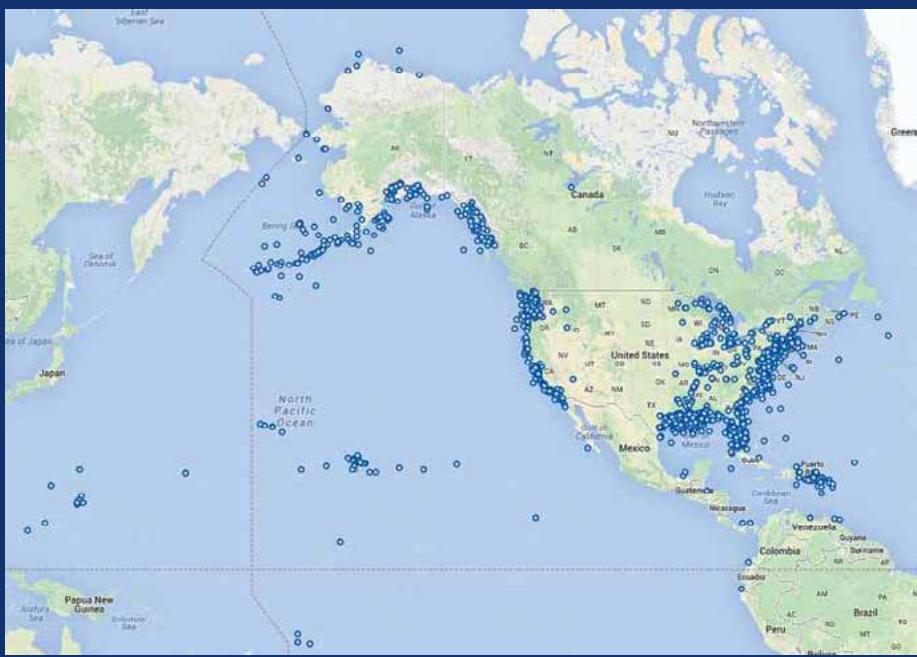
This early spilled oil research team has grown into NOAA's Office of Response and Restoration's Emergency Response

Division (ERD)—a diverse team of chemists, biologists, geologists, information and data management specialists, and technical and administrative support staff. ERD personnel provide federal on-scene coordinators (FOSCs) with round-the-clock scientific expertise for oil and chemical spills in U.S. coastal waters.

Scientific Support Coordinators

In 1980, the National Oil and Hazardous Substances Pollution Contingency Plan formally recognized NOAA's scientific support coordinators (SSCs) as a special team that can be called upon to support the FOSC.² NOAA SSCs also have a close working relationship with the other special teams such as the USCG National Strike Force and regional strike teams.

The NOAA SSC provides scientific information and recommendations to the FOSC directly as a member of his or her command staff and works directly with many technical specialists in the environmental unit to coordinate scientific



Some of the nearly 3,000 oil spills and other incident responses for which NOAA's Office of Response and Restoration provided scientific support. Photo courtesy of the National Oceanic Atmospheric Administration.

and environmental solutions, including those involving pollution transport, oil fate and effects, resources at risk, field surveys, and cleanup countermeasures. SSCs also serve as liaisons to natural resource trustees and the scientific community.³

Responding to Environmental Threats

In a typical year, ERD staffers respond to more than 120 incidents, including oil and chemical spills, hazardous marine debris, threats to navigation, and natural disasters such as hurricanes and tsunamis.

During responses, Emergency Response Division personnel model spilled material trajectory, assess complicated

mixtures of chemicals, conduct aerial surveys and shoreline assessments, serve as advisors on environmentally sensitive areas, coordinate scientific activities at spills, manage data, and provide the FOSCs with access to other NOAA products and services.

Staying Prepared Between Spills

Between spills, the Emergency Response Division hosts training and technical workshops and staffers participate in preparatory exercises, develop guidelines with national and regional response teams, and produce response and planning tools.

In 2014, ERD staff trained more than 2,000 responders from dozens of government agencies and organizations, including the U.S. Coast Guard, EPA, U.S. Navy, industry,

nongovernmental organizations, tribes, and state agencies. In addition, ERD personnel supported more than 40 oil spill drills and preparedness activities, involving 13 states and Canada.

More Than Just Spills

Early program goals focused on forecasting the fate of the spilled pollutants and serving as a liaison with the local scientific community, and those are still important program aspects. For example, during the *Deepwater Horizon* oil spill, NOAA issued the first trajectory forecast within a few hours of the rig explosion, and over the course of the spill, prepared hundreds of trajectory forecasts, products, and reports to assist the unified command. But SSCs respond to more than just oil and chemical incidents.

The scientific support team continues to improve its key products and services, but also stands ready to support training, emerging issues, and all-hazards response. The same oceanographic modeling skills used for tracking oil have been used for search and rescue, locating downed aircraft, and tracking drifting objects of all sorts. When the March 2011 earthquake and tsunami struck Japan, it generated huge amounts of marine debris, and the NOAA scientific support team modified its oil spill models to help predict when and where shorelines would be affected.

SSCs routinely deploy to help FOSCs address response issues after hurricanes, including spills from damaged coastal industries, ruptured petroleum storage tanks, sunken and stranded vessels, and marine debris. After the emergency response, the team continues to work with federal, state, and local agencies to reduce environmental impact, restore



NOAA's Office of Response and Restoration and its partners customize and display data for regions across the U.S. in ERMA, an online mapping tool for improving scientific coordination during an environmental incident response. Photo courtesy of the National Oceanic Atmospheric Administration.



A drilling rig is aground near Kodiak Island, Alaska. U.S. Coast Guard photo.

coastal habitats, and improve the tools needed to prepare for the next disaster.

Continuing Innovation

The NOAA Gulf of Mexico Disaster Response Center (DRC), the newest addition to the Office of Response and Restoration, brings together NOAA-wide resources to improve preparedness, planning, and response capacity along the Gulf Coast. Located in Mobile, Alabama, the center is focused on the five states bordering the Gulf of Mexico.

The facility is designed to survive up to Category 5 hurricane winds, contains a tornado shelter, and has backup power systems to continue operations in the midst of severe weather. Intended to serve as a safe and ready command center during major disaster responses in the Gulf, the DRC also offers facilities for drills, training, workshops, and planning activities.

All Told

During the past 40 years, the NOAA scientific support team has continued to assist FOSCs to address pollution threats from oil and chemical spills and is evolving to support all hazards and emerging risks in the coastal zone. Between spills, ERD personnel enhance their expertise and that of the USCG and response community through training, support to drills and exercises, research, and contingency planning.

About the author:

Mr. Doug Helton manages spill response efforts at NOAA's Office of Response and Restoration, western regional office, in Seattle. He has supported hundreds of spill responses, earning a NOAA Administrator's award for his work on the problem of undersea wrecks and a Department of Commerce bronze medal for safeguarding navigation and natural resources from hurricane debris.

Endnotes:

1. See <http://incidentnews.noaa.gov/incident/6231>.

2. March 19, 1980, 45 FR 17832.

3. ERD works closely with NOAA's Assessment and Restoration Division and other federal, state, and tribal trustees to ensure that preliminary Natural Resource Damage Assessment activities are coordinated with the operational response.

For more information:

All statistics courtesy of NOAA. Visit the NOAA Office of Response and Restoration website at <http://response.restoration.noaa.gov>, to find tools, resources, and training for oil and chemical spill response. To learn more about spill response issues and events, visit the blog at <http://usresponserestoration.wordpress.com>.



An Energy Renaissance

New fuel transport methods bring potential new risk.

by LT AARON JOZSEF
*Chemical Officer
 Gulf Strike Team*

North American crude petroleum production has rapidly risen the past several years, as a result of nontraditional drilling techniques used to access formations in Canada, North Dakota, Texas, Colorado, Florida, and Pennsylvania.

This petroleum production growth has outpaced the nation's current fixed infrastructure and pipeline carrying capacity. As a result, producers are using rail cars, tanker trucks, and barges to move these crude products to coastal refineries and distilleries. Areas seeing significant increases in commerce and maritime traffic include the Columbia River system, the Hudson River, and the Mississippi River and associated navigable waterways.

Transport Challenges

Unlike traditional crude oil reserves, these formations produce petroleum with varying physical properties and hazards. For example, Canadian oil sands are so viscous that producers add petroleum diluents for easier transport; and,

in some cases, transporters heat rail cars until the product reaches a temperature at which it can be efficiently pumped.

Conversely, oil from the North Dakota shale formation is typically more like gasoline—low viscosity, high volatility, high flammability and similar benzene, toluene, ethyl benzene, xylene (BTEX) levels. Texas shale oil has similar physical properties and hazards, with the additional hazard of ignition potential through static discharge.

As this oil production continues to rise and more producers identify formations through further exploration, pollution incidents involving these products may increase and consequently pose threats to responders and the environment. Therefore, area committees and response organizations need to be aware of the products that move through their areas of responsibility.

Pay Attention to Details

For example, companies generate safety data sheets (SDSs) for the crude oil they are transporting or refining, and responders should pay particular attention to SDS values.

As oil formations can vary greatly from one geographic location to the next, companies may also use generalized SDS for their products and may not be required to analyze the physical characteristics for each shipment of crude oil they are transporting. Thus, physical properties within each load may vary and pose their own unique hazards. Responders must treat each response uniquely and carefully review the product's SDS.

On numerous incidents involving these non-traditional oils, responders have observed various specific hazards. For example, producers may use natural gas condensate to dilute Canadian oil sands. Natural gas condensate may



Assessment crews conduct a post-incident river survey. U.S. Coast Guard photo by Petty Officer Mariana O'Leary.

also be referred to as “petroleum distillate,” which is a dangerous good under the International Maritime Dangerous Goods Code.

Some of its hazards include:

- It is easily ignited via heat, spark, or flame.
- The vapors form explosive mixtures with air.
- Contact can be toxic.
- It is volatile at room temperature.

Additionally, once the diluent is separated from the product, the original physical properties of the bitumen return, which emulate characteristics of roofing tar. In a marine or aquatic environment, and under the right conditions, this dense product could sink to the bottom of the impacted waterway, making recovery efforts far more challenging and time-consuming.

Volatile Organic Compounds

As it would happen, low-viscosity oil response is no picnic, either. The Gulf Strike Team recently responded to such a spill into the Mississippi River after a tank barge was breached during a collision.

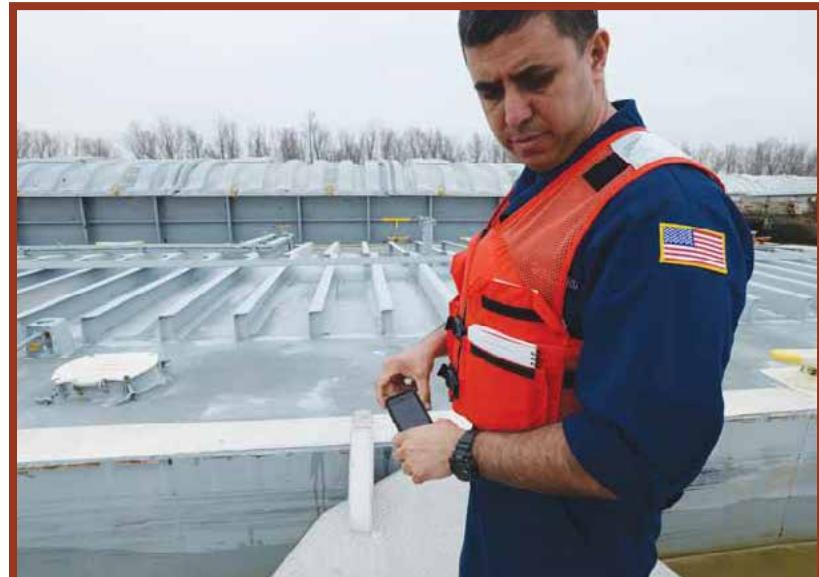
Even under cool atmospheric conditions (approximately 45°F), 12 hours after the incident, the air around the damaged barge still registered volatile organic compounds (VOCs) of 200+ ppm, and benzene levels measured 40.2 ppm, which significantly exceeded Coast Guard personnel occupational exposure limit. In addition to physical measurements, subsequent laboratory analysis found levels for naphthalene, a highly toxic polycyclic aromatic hydrocarbon, at 2,000 ppm.

Volatile organic compounds are health hazards, and each type of oil is acknowledged to contain these compounds, which present, at a minimum, an inhalation hazard to responders. To mitigate this hazard, responders should deploy appropriate detection equipment to identify and quantify the hazard, then implement appropriate personnel protective strategies, such as air purifying respirators.

Each strike team maintains air monitoring equipment that can quantitatively and qualitatively identify hazards, including BTEX. Additionally, strike teams and the National Strike Force Coordination Center have staff industrial hygienists who can help response personnel evaluate risks, interpret SDS information, and develop and review site safety plans.

Important Considerations

- Consider the product, its hazardous properties and values, and recognize that variations may exist.
- Do not ascribe to any generalization for a product—thoroughly inspect and understand the safety data sheet.
- Properly detect, identify, and quantify hazards, before taking action.
- Use appropriate air monitoring equipment.
- Develop effective protection strategies and mitigate hazards through safety protocols.



Chief Petty Officer Clifford Brack, a damage controlman with the Gulf Strike Team, inspects a barge. U.S. Coast Guard photo by Petty Officer Matthew Schofield.

So on-scene coordinators can contact their servicing strike team should a need arise for air monitoring equipment, response personnel, or consultation regarding safety protocols and response tactics.

About the author:

LT Aaron Jozsef is the Gulf Strike Team chemical officer. He previously served as a deck watch officer aboard USCGC Valiant and as a District 7 SAR controller. LT Jozsef graduated from the University of Miami with a marine science degree.

Editor's note: Some of the incident statistics and information in this article come from internal Coast Guard reports and may not be available online.



From Oil Spills to Chemical Releases

The Environmental Protection Agency's role in national response.

by Ms. DANA TULIS
Deputy Director
Office of Emergency Management
U.S. Environmental Protection Agency

In 1968, the first National Contingency Plan provided U.S. officials with a coordinated approach to cope with spills in U.S. waters, including requirements for accident reporting and spill containment and cleanup.

Today, during an oil and hazardous material release response, either a U.S. Coast Guard captain of the port or an Environmental Protection Agency (EPA) official serves as the on-scene coordinator (OSC), depending on the spill's location.

Each agency also has special teams to support the OSC. The EPA's teams are:

- the Chemical, Biological, Radiological, and Nuclear Consequence Management and Advisory Division;
- the Environmental Response Team;
- the National Criminal Enforcement Response Team;
- the Radiological Emergency Response Team.

The National Strike Force (NSF), consisting of the Atlantic, Gulf, and Pacific Strike Teams, is the Coast Guard's "go to" resource for oil and hazardous substance response.

To facilitate this partnership, EPA on-scene coordinators have pre-established interagency agreements with the National Strike Force that enable coordination, training, and response. This coordination has served both agencies well and has facilitated response to incidents from the Columbia Shuttle recovery to Hurricane Sandy response.

The National Response Team

The EPA and USCG routinely coordinate at the national and regional levels. For example, as the EPA Office of Emergency Management deputy director, I chair the U.S. National Response Team (NRT) and the USCG chief of the Office

of Marine Environmental Response Policy serves as vice chair.¹ As such, we coordinate member resources to optimize the federal government's response assets.

At the regional level, the EPA's regional removal manager and USCG's district office's representative co-chair regional response teams (RRTs). The 15 federal agencies coordinate with the co-chairs, as incidents at the RRT level may include cross-jurisdictional response coordination and involve multiple federal agencies.² Of course all incidents begin at the "local" level, so the EPA and the USCG frequently train with local, state, and other responders.

Typically, the EPA and USCG respond to a spectrum of cases ranging from oil spills to chemical releases, but as nefarious individuals consider using chemical, biological, radiological, and nuclear (CBRN) components against the U.S., we responders must evolve our capabilities to meet these emerging threats. Actual responses aid this effort, as we learned in a response that highlights several components of a CBRN incident.

Sulfur Mustard Incident

The Exposure

In June 2010, a clam dragger operating off the coast of New York pulled up several World War I-era sulfur mustard munitions. When a crew member attempted to throw the munitions overboard, one struck the vessel's gunwale and broke open on the deck. The impact released contents, and exposed crew members to sulfur mustard agent, also known as "mustard gas."

Within a few hours, a crew member began to display symptoms of exposure, so the captain returned to New Bedford Harbor, so the symptomatic crew member could receive





Entry teams on the dock.



Clam cleanup. Environmental Protection Agency photos by OSC Elise Jakabchazy.

medical attention. Fortunately, due to recent chemical warfare training, a nurse at the hospital recognized the symptoms of sulfur mustard exposure, and blood tests confirmed it.

The vessel captain, however, remained unaware of this and off-loaded approximately 200 tons of his potentially sulfur-mustard-contaminated catch of clams.

Before heading back to sea, the captain brought on a new crew member to replace the injured worker. But shortly after departure, a second crew member complained of symptoms indicative of sulfur mustard exposure, and the vessel again returned to New Bedford where emergency medical service personnel transported him to a local hospital.

Upon debarking the second crew member, U.S. Coast Guard personnel, now aware of the potential vessel contamination, ordered the captain to anchor offshore and placed the vessel into quarantine. Meanwhile, Massachusetts Department of Public Health representatives embargoed the clam catch, effectively placing the refrigerated clam sorting facility under quarantine, as well.

All Hands on Deck

Since the federal on-scene coordinator response zone for New Bedford Harbor falls within the USCG jurisdiction, the captain of the port was designated the lead federal official. If you remember recent history, you'll realize that this incident occurred during the height of the *Deepwater Horizon* response, while many USCG assets were deployed to the Gulf of Mexico, which complicated matters for the captain.

As it would happen, this was also the captain's first day at his new duty station. Nonetheless, he put together a unified command (UC) that included the Atlantic Strike Team, the New Bedford Fire Department, the Massachusetts Department of Environmental Protection, the Massachusetts National Guard civil support team, an EPA OSC, the U.S. Navy explosive ordnance disposal unit, the Port of Providence marine strike force, and the New Bedford fire and police departments.

While the Navy team removed the fuse, multi-agency entry teams confirmed mustard agent contamination and brought crew members ashore for decontamination and medical screening. EPA efforts included evaluating decontamination and clearance options for the vessel, clams, and clam sorting facility, and options for waste disposal.

The Response

From the start, the unified command faced a series of major challenges, such as:

- What should be done with the quarantined fishing vessel, the embargoed catch, the clam cages, and the refrigerated clam sorting facility?
- Were there any more munitions within the catch that had not yet been located?
- What clearance levels would determine when the responders could return the property and infrastructure to service?

During the first days, responders consulted with their special teams and technical specialists, including the National Homeland Security Research Center and EPA's Chemical, Biological, Radiological, and Nuclear Consequence Management and Advisory Division and Environmental Response Team to develop a decontamination strategy.

WW-I-Era Chemical Weapons

Mustard gas was used during World War I primarily as an incapacitating agent and is deadly to less than 1 percent of exposed individuals.

After the war, as part of the armistice and Treaty of Versailles, chemical weapons (including sulfur mustard agent) were banned. Since countries were tasked to dispose of their stockpiles, many times barrels containing chemical weapons were dumped in the ocean.

For more information, see the Chemical of the Quarter feature in this edition.



Vessel Decontamination

The plan called for applying undiluted household bleach to noncorrosive surfaces and diluted bleach to corrosive surfaces, followed by a water rinse. The team devised two protocols to decontaminate the hold where the clams had been stored, based upon the ambient temperature. In warmer temperatures, responders rinsed and agitated the hold with sea water, but when the temperatures were colder, employed a decontamination method involving undiluted bleach.

The USCG sector and Atlantic Strike Team personnel ensured that the decontamination water was sampled before proper disposal. The sea water used in the hold contained no sodium hypochlorite, and that water was discharged back to the sea.

After hold decontamination, teams conducted air monitoring and wipe sampling in areas used by the exposed crew members.

The Catch

To ensure there were no additional munitions in the remaining catch, responders temporarily removed the clams from refrigerated storage and scanned them with a U.S. Customs and Border Protection mobile cargo scanner. No munitions were found, and the clams were then returned to refrigeration.

During the response, the USCG FOSC also tasked EPA personnel with selecting disposal options for the clams. They came up with three options:

- disposal at sea;
- landfill burial;
- incineration at a transfer, storage, and disposal facility.

The first two options were determined to be infeasible, due to a combination of factors, including public acceptance, cost, and an international ban on disposal of chemical munitions at sea; the need for analytical data from a source for which there were no existing sampling protocols; and the fact that the clams were already dead and putrefying.

Eventually, the UC agreed that the best approach would be to transfer the clams from their cages into lined cubic yard boxes before sending them in refrigerated trucks for incineration at a transfer, storage, and disposal facility.

Decontaminating the Clam Cages, Storage Facility, Truck

As the clams were loaded onto refrigerator trucks for transportation to facilities in Texas and Arkansas for incineration, workers implemented the EPA's plans to clear the affected

property (the vessel, the cages, the clam storage and sorting facility, and eventually, the refrigerator trucks that were used during transportation).

During this clearance phase of operations, EPA responders collected the surface wipe samples from the vessel, the clam sorting facility, the clam cages, and the refrigerator trucks, which were then analyzed at an EPA lab. An EPA subject matter expert provided risk-based "clearance goals"³ to inform the UC regarding the methods used to determine the presence of sulfur mustard on inanimate surfaces and to estimate if residual contamination had the potential to cause adverse health effects.

Fortunately, all sample results were shown to be below the specified in the clearance goals, so the USCG FOSC released the vessel and the clam cages and cleared the clam sorting facility for reuse.

Finally all of the refrigerator trucks returned to New England for decontamination and clearance, and the last refrigerator truck was cleared for reuse about six weeks after the initial incident.

About the author:

Ms. Dana Tulis is the deputy office director for the EPA Office of Emergency Management. She has more than 31 years of experience in the environmental field. She has provided leadership to the agency in determining the approach and supporting responses for chemical, biological, and radiological environmental responses since the 9/11 attacks.

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Visit www.uscg.mil/hq/nsfweb/AST/Site>Welcome%20_files/Briefing%20Book%202012.pdf.

Visit www.mass.gov/eea/docs/dep/cleanup/sites/nb610.doc.

Endnotes:

¹ The National Response Team is an organization comprised of 15 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents. The National Oil and Hazardous Substances Pollution Contingency Plan and the Code of Federal Regulations (40 CFR part 300) outline the role of the NRT and Regional Response Teams (RRTs). The NRT also develops procedures, in coordination with the National Strike Force Coordination Center, to ensure the coordination of federal, state, local governments, and private response to oil discharges and releases of hazardous substances (40 CFR § 300.110 (h) (5)). The response teams are also cited in various federal statutes, including Superfund Amendments and Reauthorization Act (SARA)—Title III and the Hazardous Materials Transportation Act [HMTA]. Responses at this level are typically conducted using the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) authorities assigned by the Department of Homeland Security (DHS) whereby agencies are tasked with work orders using mission assignments (MAs) within an appropriate emergency support function (ESF) (e.g., aspects of the incident within their particular expertise). Typically, the EPA and NSF respond to large disasters or incidents with authorities granted to them through the ESF#10 Oil and Hazardous Materials MAs.

² See www.nrt.org/Production/NRT/RRTHome.nsf/AllPages/othr_rrt.htm?OpenDocument, for more information on these agencies.

³ The methods used to estimate risk-based clearance goals for surfaces contaminated by sulfur mustard are consistent with those developed by the EPA's Agency for Toxic Substances and Disease Registry, Occupational Safety and Health Administration, the New York State Department of Health, and the New York City Department of Health and Mental Hygiene for calculation of risk-based surface clearance goals subsequent to the World Trade Center collapse.



That's a Lot of Oil

A National Strike Force Superfund response.

by MR. DALE R. HEMENWAY
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MR. JAMES W. SNYDER
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Burning tires are a major concern for responders since they can produce up to a gallon of oil per tire. This is what LCDR Klaus Adie, Atlantic Strike Team (AST) executive officer, advised Tom Massey, the Environmental Protection Agency's federal on-scene coordinator, on the evening of October 31, 1983, after a large fire broke out near Winchester, Virginia. Records indicated between 5 to 7 million tires were on location—that's a lot of oil.

ramzihachicho/iStock/Thinkstock

Two For the Price of One

Most strike team cases are either oil or chemical responses—the Winchester tire fire was both. By the next day, toxic smoke rose up more than 4,500 feet into the sky and drifted over parts of Virginia, West Virginia, Maryland, and the District of Columbia. Soon after, hot, greenish, 30-weight motor oil began flowing.

Mr. Massey contacted the U.S. Coast Guard Atlantic Strike Team in Elizabeth City, North Carolina, to request the team provide air monitoring for the large tire fire.

Responders set up an incident command center approximately one mile from the fire and began digging trenches to direct the oil flow toward a man-made collection pond, where pumps would transfer the hot oil to a temporary storage device. AST personnel also deployed a containment boom in the small creek that led from the pond to contain runoff.

Major Issues

With the immediate danger now contained, responders identified three major issues, as the team began working near the fire:

1. Intense heat could be felt from as far away as 1,000 feet.
2. Smoke created blind spots.
3. Oil in the containment pond could reignite.

To combat these, the safety team required that responders work in two-man teams and brought in an airport fire truck to layer foam on the pond.

Ain't no Fire Like a Tarr Fire

As the fire response grew, so did the media coverage. As the community learned more about what was happening, a local church displayed the following message on the church-yard sign: "Ain't no Fire Like a Tarr Fire." The sign made national news, and was unfortunately prophetic.



Strike Team Response Equipment and Personnel

Field Support

- ▶ on-scene technical assistance;
- ▶ site safety monitoring;
- ▶ air monitoring and sampling support;
- ▶ cost documentation;
- ▶ command post organization, staffing, and documentation;
- ▶ cleanup equipment;
- ▶ communications support.

Communications Response

- ▶ chemical hazard assessment and research,
- ▶ air release modeling,
- ▶ response methods recommendations,
- ▶ long distance communications.

Equipment

- ▶ command post,
- ▶ communications trailer,
- ▶ support vehicles,
- ▶ viscous oil pumping system,
- ▶ submersible and non-submersible pumps,
- ▶ type "o" portable dracone,
- ▶ personal protective equipment,
- ▶ air monitoring equipment.

For example, AST members also used a dracone (a large rubber container that expands as product is pumped into it) to store cooled oil. It is designed to float, as the strike team typically deployed to oil spills on water.

In this response like no other response, however, strike team members graded an area for the 300-foot, by 8-foot dracone to rest in. Unfortunately, at night, the dracone looked like a paved road ... and a large piece of equipment ran over it, rendering it inoperable.

Additionally, responders used a 9-foot long, double-stage pump that weighed 500 lbs. and had a pumping rate of 900 to 1,645 gallons per minute.

"Treats" Followed "Tricks"

The good news: Strike team members, ever resourceful, used vacuum trucks to recover the oil, and then transferred it to tank trailers. Also, as a result of this response (and many others), National Strike Force personnel now use a pump that is less than two feet long, weighs 197 lbs., and features a pumping rate of 2,000 to 3,000 gallons per minute.

In Sum

The numbers:

- The AST continued working full force from Nov. 1, 1983, to Jan. 12, 1984.
- The fire was declared out on July 4, 1984.
- Total oil runoff was estimated at 840,000 gallons and the final costs for response, cleanup, and court proceedings totaled \$11.8 million.

And finally, the site was deleted off the EPA Superfund cleanup list on Sept. 30, 2005—22 years later.

About the authors:

Mr. Dale R. Hemenway is a preparedness specialist at the National Strike Force Coordination Center. He spent more than 22 years on Coast Guard active duty, with three tours on the Atlantic Strike Team, and retired as a machinery technician chief.

Mr. James W. Snyder is a preparedness specialist at the National Strike Force Coordination Center. He is a retired U.S. Coast Guard damage controlman chief, with duty tours that included service on the Atlantic Strike Team and two marine safety offices.

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Visit www.epa.gov/superfund/sites/index.htm.



Keeping It Safe

Strike Force members collaborate to clean a poisonous substance.

by Mr. J. J. KICHNER, P.E.

*Principal
KSEAS, LLC*

In January 1992, a vessel lost 21 containers in heavy seas, while en route from the Port of New York to the Port of Baltimore, Maryland. Out of that number, four lost containers contained arsenic trioxide. The Atlantic Strike Team was tasked with supporting the search and recovery for the lost containers, and the vessel continued its voyage and arrived in Charleston, South Carolina.

Meanwhile, Down in Cargo Hold 1

As it was unloading additional cargo, Marine Safety Office Charleston inspection team members boarded the vessel and discovered a thick, grayish powder on a cargo hold deck. A drum in the area read "magnesium phosphide," which produces highly poisonous and flammable phosphine gas when exposed to moisture.

In response, the captain of the port (COTP) ordered all operations shut down and contacted the product manufacturer for advice on the best way to mitigate the situation. When the manufacturer's representative arrived on the scene, he confirmed that the powder was magnesium phosphide, and stated that the best means to neutralize the powder was "wet" deactivation—to place it in water where it would react and "bubble off" the phosphine gas.

Responders sprinkled a small amount of this substance into 55-gallon drums of water to test this method, and the expected bubbling occurred. However, things were about to change. As personnel continued the test, a small lump of the substance about the size of a sugar cube hit the water, and a large flame erupted.

Given the violent reaction, the COTP ordered the ship to anchorage, evacuated all nonessential crew, and called

the Gulf Strike Team. At the time, I was Gulf Strike Team commanding officer. The conversation went something like: "We're having quite a party up here. You wanna come up?"

The Gulf Strike Team Joins the Party

In sum, the COTP requested that we provide a full situation assessment, evaluate potential issues with other cargo on the vessel, develop and evaluate possible mitigation strategies, and provide documentation support for federal expenditures. It was going to be one heck of a party.

The Gulf Strike Team brought its chemical response trailer along with additional logistics and personnel support from the Atlantic and Pacific teams. While the Atlantic team was still searching for the lost arsenic trioxide containers off the New Jersey coast and was manpower-low, they still provided personnel to support the Charleston response.

We integrated the various strike team members into a unified force and got to work. First of all, the magnesium phosphide was not listed on the vessel's dangerous cargo manifest, which raised serious questions as to what was on the vessel. We could see, through binoculars, large amounts of



The vessel arrives in the port of Baltimore with a 40-foot container dangling off the side. U.S. Coast Guard photo.



National Strike Force members in Level A "moon suits" prepare to deactivate magnesium phosphide. U.S. Coast Guard photo by Petty Officer Richard L. Woods.

You Think It's So Easy; You Try It!

As the response continued, some of the news media personnel started to ask why the response effort was taking so long.

So Public Information Assist Team (PIAT) personnel decided to have a media day at the command post. To demonstrate why response efforts took time, they offered to suit up two members of the news media in Level A and Level B response gear.

One member became extremely anxious and had to be taken out of the claustrophobia-inducing Level A suit. Another member of the media volunteered to step in.

Once they were dressed out, PIAT personnel challenged them to play a game of one-on-one basketball.

And, after this "press conference," there was never another mention of why the response effort was taking so long.

white powder on deck, and huge streaks of white powder on the hull.

Unknown Substance

The white powder could be soda ash, used to clean up spilled arsenic trioxide, when the vessel was docked in Baltimore. Or, it could be arsenic trioxide or some other substance. So, a combined team of Gulf, Atlantic, and Pacific Strike Team personnel suited up in Level B, brought back samples, and passed them to the National Oceanic and Atmospheric Administration's (NOAA) scientific support coordinator for analysis.

Onboard air monitoring showed no concentration of phosphine gas anywhere on deck, except in small amounts in

the immediate vicinity of the No. 1 cargo hatch. No other significant hazards were noted.

NOAA got us the lab results within 24 hours, which revealed that the white powder scattered on the deck of the vessel was 68 percent pure arsenic trioxide—a highly poisonous substance. So, while our response was initially focused on mitigating the magnesium phosphide contamination in cargo hold No. 1, now we also had deal with a 450-foot ship that was contaminated with arsenic trioxide.

Go Level A

This bumped us up to Level A response—National Strike Force's first on a vessel at anchorage. MSTD Ken Lukins and MK1 "Junior" Garza suited up, surveyed the hold, and found about 500 lbs. of magnesium phosphide. Readings of phosphine gas concentrations were hotter than expected—twice the IDLH (immediately dangerous to life or health) concentration.

Just before departing, Lukins and Garza raked the magnesium phosphide to expose fresh powder to the atmosphere, which allowed a slow reaction with the air and humidity. As rain and high humidity was forecast for the next five days, we buttoned up the hold, since we were dealing with a highly water-reactive chemical.

Now that we knew what we were dealing with, the team decided to first mitigate the magnesium phosphide situation and then deal with the much larger issue of the arsenic trioxide.

During the next month, we cleared a path through the arsenic trioxide to allow hold access. (Level A responses take time! See sidebar.) Down in the hold, we raked the magnesium phosphide to allow moisture to contact fresh chemical slowly off-gas phosphine gas. If rain and weather prohibited



Port side of the vessel after damaged general cargo container was removed. Arsenic trioxide drums and overpacks are in foreground. U.S. Coast Guard photo.

work in the hold, we worked to clean up the arsenic trioxide on deck.

The Wet Method

While work continued, a contractor designed a wet deactivation system—minus the fireball. The final result included a reactor with an air-driven stirrer to create a downward vortex, a nitrogen line, and a water fog nozzle to prevent flare ups.

Following this method, personnel placed the magnesium phosphide into cotton socks in amounts less than 1 lb., which were then placed in a metal cage on the end of a long pole. This allowed response personnel dressed in protective fire suits to place the magnesium phosphide into the water bath from a safe distance.

This all took place on a barge alongside the contaminated vessel, and tugs kept the vessel positioned advantageously into the wind. On February 10, efforts to neutralize the magnesium phosphide were complete.

Teamwork

The success of this case can be summed up in one word—teamwork. For instance, the National Strike Force integrated three teams from three coasts into a cohesive team. NOAA also provided a team of dedicated and talented individuals who provided the information necessary to make critical decisions. Active duty, reserve, and auxiliary members from Marine Safety Office Charleston also worked alongside the NSF to get the job done.

Other teams included the St. James Fire Department HAZMAT team, who worked alongside the National Strike Force responders, and the Charleston County Emergency Medical Team personnel who provided medical support.

It was an honor to work with such talented and dedicated individuals, and I appreciate the opportunity to tell this story. It is just one small example of the many great things the National Strike Force has accomplished in its tenure.



A rack of arsenic trioxide drums in overpacks are washed thoroughly when brought to the surface. U.S. Coast Guard photo.

About the author:

Captain Kichner retired after more than 28 years in the U.S. Coast Guard having served most of his career in marine safety. His assignments included commanding officer, Gulf Strike Team; executive officer, National Strike Force; and commanding officer USCG Marine Safety Office Mobile, Alabama. He is presently owner of KSEAS, LLC. He is a 1974 graduate of the U.S. Coast Guard Academy with a B.S. in chemistry and an M.S. in chemical engineering from the University of Maryland. He is a registered professional engineer in chemical engineering.

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National Strike Force CBRN Operations

Specialized teams with specialized capabilities.

by CDR TEDD HUTLEY
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U.S. Coast Guard Gulf Strike Team

LT BROWNIE KUK
Marine Environmental Response Branch Chief
U.S. Coast Guard Sector Los Angeles-Long Beach

The Coast Guard conducts operations throughout a vast and dynamic maritime environment through a multi-dimensional framework of authorities, capabilities, competencies, and partnerships. However, operational commanders do not always have the capacity or specialized capabilities within their command forces to meet diverse and constantly evolving maritime threats.

This is where the deployable specialized force (DSF) comes in, to augment and support the operational commander by rapidly deploying with a broad range of specialized skills in maritime law enforcement; joint operations; boat operations; port security; marine environmental protection; and chemical, biological, radiological, nuclear, and explosive detection and response.

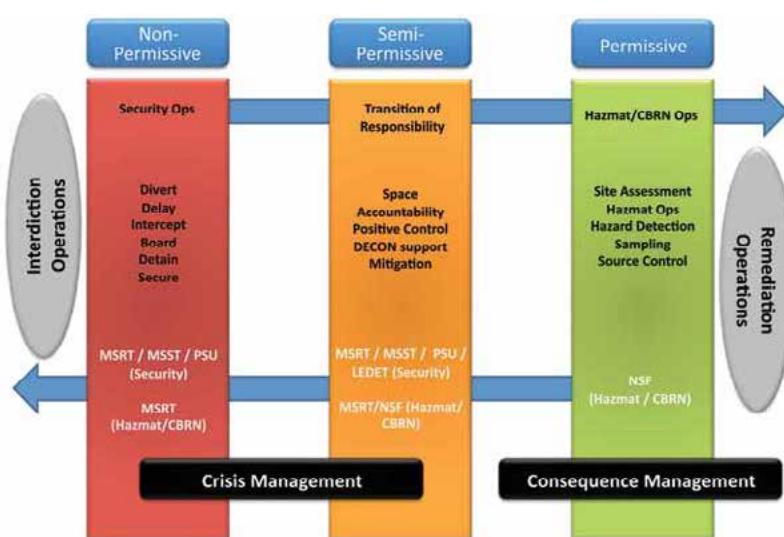
DSF units include:

- maritime safety and security teams,
- the Maritime Security Response Team,

- tactical law enforcement teams,
- port security units,
- the National Strike Force,
- the Incident Management Assistance Team ,
- the regional dive locker.

Though the term may be new, the concept of small, deployable, highly trained Coast Guard units providing unique capabilities to operational commanders is not. Arguably the grandfather of the present day DSF, the National Strike Force (NSF), is one of the oldest deployable units Coast Guard leaders specifically created to provide specialized marine environmental response capabilities to operational commanders.

Each DSF unit brings specific response capabilities. The NSF is most recognized for oil and chemical environmental response, but it has a long history of supporting operational commanders in a variety of incidents.



Threat spectrum for deployable specialized forces chemical, biological, radiological, and nuclear joint operations. Figure by LT Brownie Kuk.

Chemical, Biological, Radiological, and Nuclear Events

Capitol Hill Anthrax Response

On October 17, 2001, the National Strike Force received a request for assistance from the Environmental Protection Agency (EPA) following the intentional release of the deadly biological agent anthrax in the District of Columbia.

The NSF response team helped the EPA collect more than 8,000 samples from 21 Senate and House of Representative offices and remediate five contaminated buildings.

Capitol Hill Ricin Incident

On February 3, 2004, the EPA requested NSF assistance with the decontamination of a ricin-contaminated suite inside the Dirksen Senate Office Building

in the District of Columbia. Working in conjunction with the EPA, the United States Marine Corps Chemical Biological Incident Response Force, the United States Capitol Police Hazardous Materials Response Team, and NSF personnel made entries into office spaces to remove potentially contaminated materials from all congressional buildings in the Capitol complex.

Mustard Gas

In June 2010, Sector Southeastern New England received a report of a possible mustard gas exposure on a clam dredger. The National Strike Force worked with personnel from Sector Southeastern New England, the U.S. Army National Guard 1st Civil Support Team, the State of Massachusetts, U.S. Customs and Border Patrol, and the EPA to decontaminate the vessel, catch, pier, and adjoining facility. (See related article in this edition.)

National Special Security Events

Congress enacted the Presidential Threat Protection Act of 2000, which directed the U.S. Secret Service to plan, coordinate, and implement security operations at special events of national significance, such as presidential inaugurations, nominating conventions, major sporting events, and major international meetings.

The National Strike Force has a long history of supporting the Secret Service to protect the public, event participants, and dignitaries.

Presidential Inauguration

During the 56th presidential inauguration in 2009, the captain of the port for Sector Baltimore requested NSF resources, including a hazardous materials response team and chemical, biological, radiological, and nuclear (CBRN) detection teams, to conduct watches in the event of a hazardous substance release or weapons of mass destruction (WMD) response and to perform sweeps of vessels and marinas within designated security zones.

During the 57th presidential inauguration in 2013, the NSF provided air monitoring, technical decontamination for personnel and equipment, radiological isotope identification and Level A entry capabilities in the event of a hazardous substance release or WMD incident.

The EPA also requested the National Strike Force's assistance for this event. The NSF provided a liaison officer at the command post, as the direct line of communication between the EPA and Coast Guard command posts, and to help coordinate the operations surrounding the inauguration.



Personnel from the Environmental Protection Agency, the Marine Corps Chemical Biological Incident Response Force, U.S. Capitol Police, and National Strike Force decontaminate affected suites within the Dirksen Senate office building. U.S. Coast Guard photo by the Atlantic Strike Team.

Nominating Conventions

The NSF assisted other U.S. Coast Guard units and the EPA with supporting the U.S. Secret Service during Democratic and Republican national conventions. During these events, the NSF pre-staged teams for rapid response during peak convention hours. The teams also trained with their counterparts prior to the events to achieve the highest level of readiness and integration.

Sporting Events

In 2006, the Atlantic Strike Team was asked to provide support during Super Bowl XL. They provided Incident Command System coaching and support to assist the city of Detroit to meet its requirements under the National Response Plan.

In 2010, the Pacific Strike Team assisted the EPA to conduct air monitoring and sampling operations during the Rose Bowl Parade and football game.

In 2013, Sector New Orleans requested the Gulf Strike Team to provide advance CBRN reconnaissance and monitoring within the New Orleans port areas and to provide a command and control element for deployable special forces integration during Super Bowl XLVII security operations. One strike team member worked as a liaison and CBRN subject matter expert in the maritime security operations center, and two strike team personnel conducted daily patrols of ferries, ferry terminals, and the New Orleans waterfront, monitoring for chemical warfare agents and radiation.

International Meetings

At the request of Marine Safety Unit Pittsburgh, the Atlantic Strike Team worked with the U.S. Secret Service to prepare for and provide technical hazardous material, chemical, biological, radiological, and nerve agent decontamination for the president and international dignitaries in the event of a WMD incident during the 2009 G-20 economic summit. The operational commander also strategically placed a NSF



A National Strike Force response trailer is offloaded from a military transport aircraft during Operation Burnt Frost. U.S. Coast Guard photo by the Atlantic Strike Team.

small boat nearby in preparation for a potential waterside evacuation of dignitaries.

Joint DOD Missions

The National Strike Force also supports Department of Defense (DOD) operational commanders during environmental defense missions that may entail or require environmental protection and/or preservation.

Operation Iraqi Freedom

In 2003, the NSF supported Operation Iraqi Freedom's military environmental response operations. Working with the Navy supervisor of salvage, they pre-deployed spill response equipment on the *USS Comstock*.

Operation Burnt Frost

In 2008, the Department of State requested the NSF to assist the DOD and the Federal Emergency Management Agency to recover a satellite that contained toxic fuel.

Shipboard Syrian Chemical Weapons Neutralization

In 2013, the United Nations Security Council passed a resolution calling for the expeditious destruction of the chemical weapons program in the Syrian Arab Republic.

Supporting U.S. Naval Forces Europe, in coordination with the Organization for the Prohibition of Chemical Weapons, a USCG strike team detachment comprised of personnel from all three NSF strike teams and the Maritime Security Response Team was deployed to Europe.

The detachment provided a 24/7 contingency response capability to mitigate potential chemical releases on the

National Strike Force Strengths

These past cases illustrate the NSF's track record of delivering specialized capabilities to assist operational commanders in their prevention and response missions.

The key take-aways:

- Frequent work with the EPA provides NSF personnel with real-world experience mitigating toxic industrial chemicals, toxic industrial materials, radiation, biological contamination, and chemical warfare agents.
- Operational commanders are encouraged to engage the NSF early in operational planning to ensure a right-sized response capability and to leverage its strength in preserving Coast Guard maritime jurisdictional authorities during multi-agency deployments.
- The National Strike Force can be leveraged to support or complement other DSF units. For example, a CBRN mission may require decontamination for deployable specialized forces personnel and equipment after the security threat has been neutralized. The NSF exercises this type of incident transition to ensure the operational commander is fully supported through each phase of a complex maritime security incident.

military vessel during each phase of the chemical warfare agent neutralization operation.

In Sum

Depending on the operational commander's requirements, the NSF can be employed with a small or large footprint; either will result in a significant positive impact on the overall event outcome.

Whether the mission is protecting the environment, preventing terrorism, enhancing security, or providing consequence management after a catastrophic incident, the NSF stands ready to provide a broad range of specialized capabilities to help operational commanders and interagency partners meet the nation's maritime response requirements.

About the authors:

CDR Tedd Hutley is the executive officer of the Gulf Strike Team. His previous assignments include National Strike Force operations officer and Marine Environmental Response branch chief at Sector Seattle. He has a master's degree in marine affairs and a graduate certificate in global trade transportation and logistics from the University of Washington.

LT Brownie Kuk serves as the marine environmental response branch chief at Sector Los Angeles-Long Beach, overseeing pollution response operations. He previously served as the equipment officer at the National Strike Force Coordination Center, where he developed response policy and managed all response equipment in the National Strike Force's arsenal. Additional assignments include assistant operations officer and response officer at the Atlantic Strike Team.

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Experience Can Be the Best Teacher

Building federal all-hazmat response proficiency.

by LT BRYAN NARANJO
Operations Officer, Response Officer
U.S. Coast Guard National Strike Force

LTJG LEIGH VAN LEAR
Incident Management Division
U.S. Coast Guard Sector San Francisco

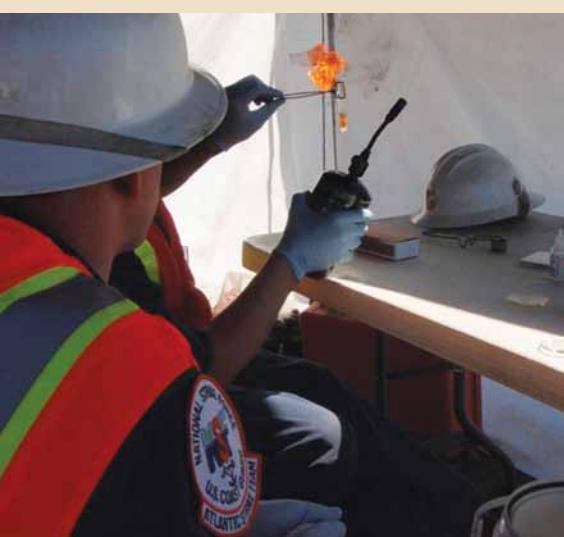
The National Strike Force (NSF) consists of three strike teams, staged throughout the nation, ready to respond at a moment's notice to emergent hazardous material and oil spill incidents, as well as weapons of mass destruction (WMD), and chemical, biological, radiological, and nuclear (CBRN) threats.

The NSF not only supports the Coast Guard, but also the Department of Defense, the Environmental Protection Agency (EPA), the Department of Energy, as well as multiple other government agencies. This provides an opportunity for the NSF to learn skills from a diverse range of responses and responders.

Typically, the NSF responds to an average of 30 significant hazardous material cases annually. These cases may take weeks to months to mitigate, and it is not uncommon for some of the more complex sites to take multiple deployments and years to complete. The NSF uses these responses—combined with extensive training programs—to build its specialty knowledge, hone technical skills, and gain the necessary proficiency to professionally respond to emergency or national-level WMD or CBRN incidents.

Lighter Aboard Ships Response

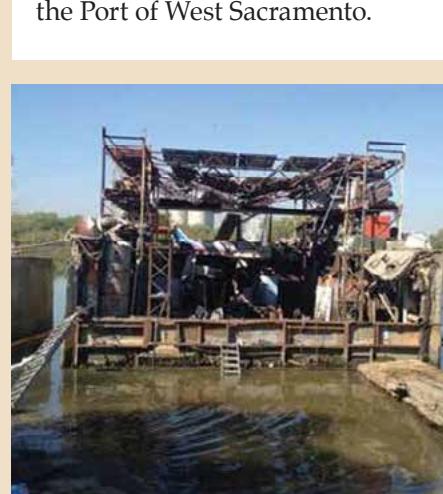
In 2013, the City of West Sacramento, California, requested the Department of Resources Recycling and Recovery and the EPA to assess several derelict vessels, including two lighter aboard ships (LASH) barges and a floating dry dock that were abandoned near the Port of West Sacramento.



A team of NSF responders identify the hazardous substance at the West Sacramento LASH barge site. U.S. Coast Guard photos by LT Bryan Naranjo.



MSTC Thomas Watts and MK2 Jeffrey Burby collect samples at the West Sacramento LASH barge site.



One of the two barges at the West Sacramento LASH barge site.



The Samoa paper mill. Photo courtesy of Steve Calanog, Environmental Protection Agency.

Assessors deemed the three vessels to be a substantial risk to the environment and public, as the barges and dry dock contained an abundance of dangerous oils and hazardous substances, including radioactive materials such as radium aircraft dials. With so many chemicals stored improperly in these unstable structures, the constant threat of an uncontrolled chemical reaction, or fire, which would have dispersed the radioactive materials, was a serious concern.

In the summer of 2013, the State of California took possession of the barges, but the scope of the hazards proved to be beyond the state's capabilities and funding limits. Ultimately, the case was federalized by Sector San Francisco with multiple other state and federal stakeholders supporting.

After federalizing the case, Sector San Francisco quickly took the lead and requested technical assistance from the NSF's Pacific Strike Team (PST). The PST mobilized to develop the mitigation plan, while managing site safety, supervising contractors, and collecting and sampling the hundreds of unknown substances removed from the vessels. The PST's 12-person hazmat response team continuously conducted air monitoring, radiation surveys of debris, hazmat extraction efforts, and maintained technical documentation for chemical disposal. Most operations to sample and classify the unknown substances were conducted in Level B personal protective clothing, providing respiratory protection via a self-contained breathing apparatus and protection from splashes within a chemical-resistant suit.

The floating dry dock contained approximately 102 five-gallon buckets of various chemicals, 86 of which the PST categorized and segregated for disposal. Approximately

35 fifty-five gallon drums of waste oils were recovered from the LASH barges, and the PST conducted pumping operations to remove an additional 1,500 gallons of waste oils from one of the two barges. Furthermore, the PST response team collected, categorized, and identified approximately 250 different chemical substances from hundreds of containers utilizing multiple chemical radiation-detection instruments.

Working on responses like the West Sacramento LASH barges contribute to the expertise of NSF personnel to respond to unknown hazardous chemicals, as the instruments and procedures personnel used on this case are those they would utilize

on a chemical warfare agent attack, radiological "dirty bomb" event, or for hazmat recovery mission after a natural disaster.

Paper Mill Response

In October of 2013, the PST received a request from EPA personnel to assist with the emergency response to an abandoned paper mill in Samoa, California. During an assessment, EPA personnel discovered approximately 2.7 million gallons of pulping liquors (a caustic liquid used to break down wood fibers), approximately 10,000 gallons of acids and more than 9,000 tons of corrosive sludge, as well as a wide range of additional lab chemicals spread throughout the site.

EPA personnel determined that the facility was an imminent threat to Humboldt Bay's pristine environment and designated the facility as one of its highest response priorities. In a further complication, some of the tanks had been filled with incompatible chemicals that were actively seeping through the tanks' walls and into the surrounding soil.

Since the facility was in various states of decommissioning, many secondary containment measures were in the process of being demolished and were not available to confine any chemicals released. As a result, some nearby ground water puddles tested as strong as some industrial corrosives. The sheer quantities of hazardous materials on the property, the degraded conditions of the tanks, and the complete breakdown of the installed pumping systems greatly increased the complexity of any proposed removal operations.

EPA staffers employed considerable effort to find a company able to manage the site, but they were unable to find



MK2 Jeffrey Burby, Pacific Strike Team, lowers a chemical-resistant pump into a degraded tank. U.S. Coast Guard photos by MKC Travis Olson.

an organization, other than the NSF, with the skill sets and equipment necessary to mitigate the hazards on this particular site. So, the PST deployed a 14-person hazmat team, and worked with Environmental Protection Agency personnel to pump approximately 168,000 gallons of caustic pulp liquors into temporary storage tanks. The team also helped identify and segregate the acids and various lab chemicals.

The PST remobilized again in February 2014, with an eight-member pumping team to assist in pumping the remaining pulping liquors from the storage tanks into the tanker trucks that transported them to another paper mill facility for recycling. Pacific Strike Team members continue to gain experience on this site, as they are projected to support the EPA in mitigating the remaining chemical hazards through 2015.

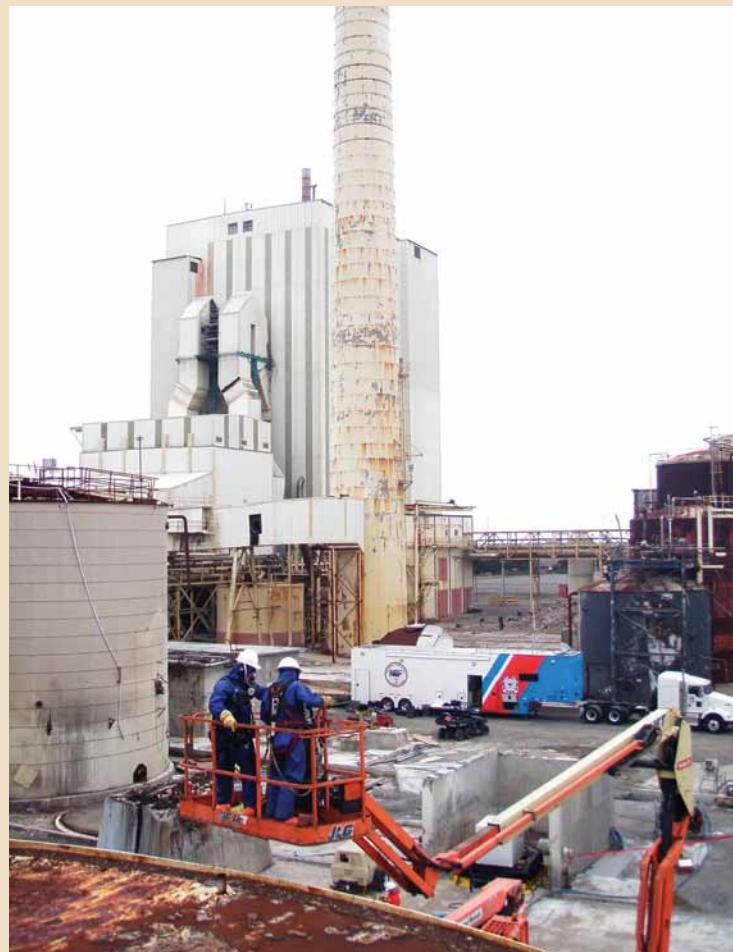
The Road to Excellence

These cases are good examples of how the NSF is fulfilling the Coast Guard marine environmental protection mission, and they also encompass the ideals within the Commandant's Direction 2014 to commit ourselves to excellence by supporting and executing our operations in a proficient and professional manner.

The National Strike Force is the only unit within the Coast Guard with the specialized equipment, technically trained personnel, and organizational structure to support these types of responses. Moreover, these unique operational processes feed into a larger pool of expertise and ensure that the NSF is ready to respond in the future.

About the authors:

LT Bryan Naranjo has served in the U.S. Coast Guard for 12 years. He has dedicated his time to the National Strike Force and has served in the Preparedness to Response Oil Spill Exercise Program, as operations officer



MK2 Jeffrey Burby and BM1 Nicholas Poen, Pacific Strike Team members, set up a chemical pumping system.

at the Pacific Strike Team, and as operations officer at the National Strike Force Coordination Center. He has participated in the responses to Hurricane Katrina, the Deepwater Horizon oil spill, and the MODU Kulluk grounding. He holds a B.S. in marine environmental science from the U.S. Coast Guard Academy.

LTJG Leigh Van Lear has served in the U.S. Coast Guard for five years and has served at the Pacific Strike Team as the chemical officer and response officer. She received a B.A. in marine affairs from the University of Miami and was commissioned after graduating from Officer Candidate School in December 2011.

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Leadership in a Time of Crisis

An interview with former NSF commanding officer,
RDML Meredith Austin.

by LT CHRISTOPHER KIMREY
*Assistant Chief of Incident Management
U.S. Coast Guard Sector San Francisco*

With a Coast Guard career strong in operational response, RDML Austin assumed command of the Pacific Strike Team in July 2001, with responsibilities to respond to oil and hazardous materials discharges for the U.S. Coast Guard and the Environmental Protection Agency for the Western United States, Alaska, Hawaii, and the Pacific territories. In June 2004, she assumed command of the entire NSF, consisting of the three regional strike teams, the Public Information Assist Team, and the National Strike Force Coordination Center.

CK: You have such a diverse response background and a long history with the NSF. Please describe September 11th as the commanding officer of the Pacific Strike Team. How did a single crisis change the paradigm of response and the fabric of the NSF?

RDML Austin: When 9/11 occurred, the National Strike Force did very little outside of oil and hazardous substance response. It had done some work with naturally occurring biological materials, but those responses were in a relatively controlled environment. We didn't yet have a fully defined mission in chemical, biological, and radiological (CBR) response. The initial response to 9/11 and the unknown of the chemical biological piece were very different from the response and recovery, the ebb and flow, of oil and hazardous substance source control we were used to.

As the scale and complexity of incident management and crisis response grows, so does the need for adaptive leadership, innovation, and vision. Although the National Strike Force (NSF) has a long and storied history, the changes experienced during the past 15 years were unprecedented. Here we share a unique insight into this transitional period through one of its key leaders, RDML Meredith Austin.



Rear Admiral Meredith L. Austin, former Commander of the Pacific Strike Team, and current Commander of the U.S. Coast Guard Personnel Service Center.

The morning the towers came down, I was stuck in Florida. The new members of my team (Pacific Strike Team) were going through their required 40-hour hazardous materials response training at the Atlantic Strike Team (AST) in New Jersey, in their first training courses toward becoming professional responders. Most of the NSF's newly reported personnel were in New Jersey at that time, pursuing professional qualifications and certifications.

Because the attacks were in New York and in the AST's area of responsibility, when the call came in that morning, the AST was the first out the door. And as soon as the newest NSF responders were finished with their 40-hour, the very minimum to respond, they were deployed as well.

"The AST was the first out the door."

CK: Tell me about operations on the ground. How was it different than other responses?

RDML Austin: When I arrived at "Ground Zero," I relieved CAPT Gail Kulisch (ret.), then AST commanding officer, as incident commander of ESF-10 response operations on scene. It became immediately evident we needed to use the

Incident Command System (ICS), but it was not a common tool at the time. At the time of 9/11, ICS was the standard command and control system for the NSF. But very few outside of the NSF understood ICS well and fewer were skilled practitioners. ICS and terrorism were not things that were on the radar at this point.

The transition to Incident Command was difficult, but necessary. We were tasked with a mission assignment—working for the Environmental Protection Agency at Ground Zero and at the waste sites—conducting air monitoring and dust-suppression activities.

So many eyes were on the NSF during that response. It was the multi-faceted set of problems with a highly political overlay that made it so challenging. It was unlike anything we'd yet seen.

CK: It was around this time that biological agents were found at the Capitol?

RDML Austin: While we were at Ground Zero, I received a call from the Gulf Strike Team commanding officer, Capt. Ed Stanton (ret.), regarding the anthrax letters, asking if biological response was something the NSF could do. That was the start to CBR work in the NSF.

No one looked at the capability of the teams before the request for forces—the NSF's make-up just "fit" the mission. A valuable feature of the teams is the ability to work independently in undefined environments; the NSF members tend to be masters in ingenuity. We easily adapted to the mission because of the operational exposure we'd already had in hazardous substance response.

At this point, we, as the NSF, began to develop our required operational capability/projected operational environment (ROC & POE). This would become a critical component for the future. It would help define what the NSF can and cannot do—it was the line in the sand. We needed to limit what we were doing, rather than become the jack-of-all-trades. But we also needed to define the things we *could* do.

"We needed to limit what we were doing, rather than become the jack-of-all-trades."

The NSF had always done oil well. But as we developed the ROC & POE, there was laser-like focus on broadening NSF capability. One of the primary tasks was to define the crisis and consequence management environments in which the NSF would operate.



National Strike Force personnel respond to the U.S. Capitol anthrax attack. U.S. Coast Guard photo.

Our emergency response levels and our response protocols changed—we adopted the highest hazmat response capabilities we could operate in.

The training our members received changed. Rather than an informal training environment, training venues changed to what we use today: Fort Leonard Wood Dismounted Recon Course, Center for Domestic Preparedness Tunnel Course, and others.

The NSF contracted the best training providers and developed specific objectives to heighten our responders' skill levels.

CK: What were your thoughts on the NSF taking on the CBR role, executing in support of the D.C. Capitol Police during the Capitol Hill anthrax response?

RDML Austin: We were working with EPA Region 2 in Edison, New Jersey, when the anthrax letters were found at the Senate Hart Building in 2001. The AST dispatched a team to the District of Columbia to support.

What made this particular case unique was the response command structure. Rather than the EPA being the primary response agency, as the incident commander, the D.C. Capitol Police, who work for Congress, held the role. This created a politicized and very dynamic response. Using ICS became essential to managing the response.

September 11th, Katrina, and *Deepwater Horizon* all shared some similarities. In these major crises, there's the incident and there's the event. The former is what we deal with immediately and tangibly—the hurricane's damage or the spilled oil in the water. The latter is the "politics" of the response, by which I mean all of the external stakeholders—government



Then-CAPT Meredith Austin, deputy incident commander of the Houma Incident Command Post, part of the *Deepwater Horizon* oil spill response, answers a reporter's questions during an open house. U.S. Coast Guard photo by Petty Officer Jonathan Lindberg.

officials at the local, state, and federal level, the public, non-governmental organizations, and the media—everyone who's interested in the incident and the steps the responders are taking to mitigate it.

"In these major crises, there's the incident and there's the event."

Each of these stakeholders will be watching what you do and will expect to be kept up to date on the situation. In managing the incident, you have to also manage the event.

CK: Through the lens of an incident commander, please describe the importance of crisis and risk communications.

RDML Austin: In Katrina, Rita, 9/11, in really any major response, it is critical to manage the expectations of the public. From the beginning, the public needs to be considered a partner in the response.

The traditional model of contingency planning for significant events, such as oil spills, needs to include local agencies in the process. *Cosco Busan* and *Deepwater Horizon* are examples of this.

As sector commander, outreach is a continual process—preparing the operating environment in the event of an incident. The enemy is the incident, not the responder.

It is vitally important to get out and meet people from other agencies as well as the media. It's much better to know them prior to the event. When you know them and they know you, it's much easier to find common ground.

"The enemy is the incident, not the responder."

CK: Given the long history of the NSF contrasted against the changing priorities of homeland security, what do you see the NSF's relevance today and into the future?

RDML Austin: CG area incident management assistance teams (IMATs) were created around 2003, but in the past, the NSF predominantly supported the incident management role at the sectors during a response. The NSF provided sector command advisement, situation and resource unit leaders, and general staff expertise during spills.

In years past, the strike teams held the storehouse of knowledge in ICS. We were practitioners and regularly integrated; we effectively augmented contractors during every major response. With the advent of the IMATs, while NSF personnel may not fill critical ICS roles during a response, they will continue to provide subject matter expertise to federal on-scene coordinators, in the command post as well as in the field. The NSF will continue to be a vital special team, as part of the National Response System.

Going forward, team standardization in the NSF is the key. It will also be important that Coast Guard sectors understand what the NSF can provide.

On-scene coordinators should understand the term "special team," as stated in the National Oil and Hazardous Substances Pollution Contingency Plan, means any OSC can request the NSF. This experience as practitioners in response provides a ready-state organic resource to sector commanders for all-hazards and hazmat response operations.

CK: In terms of value to the customer, where do you see the NSF providing the most value to incident commanders, FOSCs, OSCs, FEMA PFOs during crises?

RDML Austin: The NSF's value comes from recommendations to sector commands on oil and hazardous substance response, the ability to provide field oversight and specialized equipment, and highly trained personnel who are able to work autonomously in undefined environments. The NSF is an assisting entity; the augmentation is sage council to the requesting command.

CK: In several recent complex operations and incidents of national significance, the NSF has been designated by the affected sector as the incident-specific FOSC. Please describe the value added by selecting that course of action.

RDML Austin: By delegating FOSC authority, there is certainly value added. The sector commander is able to retain span of control. Major incidents like hurricanes Katrina and Sandy, large multi-faceted incidents with major port damage, MTSRU and hazmat issues, are perfect for incident-specific designation.

Even a Type 3 response can be delegated if the complexity warrants it. By being able to delegate the FOSC authority in complex cases to the NSF, the sector commander can focus on other aspects of the response. Letters of delegation should contain specific task direction, delegation of authority, and should also establish commander's critical information requirements.

CK: Is there anything else you would like to add? If you could share anything with future crisis managers, what would you share?

RDML Austin: First, when considering the dynamics of the incident (the crisis) and the event (the politics), what we are seeing now is the emergence of a new "normal."

Media is faster, more decentralized, and more intense. Social media has changed the dynamics of information availability and has made crises at all levels more severe in their perception. This is where meta-tools and crowd sourcing become very valuable. The National Football League and other major businesses already use these tools. It may make sense to pursue social media and these meta-tools with our basic ordering agreements for response. There may even be value in using the public as *ad hoc* field observers—"#oilonthethebeach."

During the height of the *Deepwater Horizon* response, there was too much work for one incident commander to do alone. CAPT Roger Laferriere (ret.) was the designated incident commander and I was his deputy for the Houma incident command post. He delegated the authority to make decisions within the incident command post to me to ensure the ICS planning cycle and other decisions internal to the response organization could be made in his absence. He was the public face of the incident, meeting with government officials and responders in the field, and I ensured all planning activities and critical decisions needed internal to the response occurred in a timely manner. Span of control management—ensuring there is not a single point of failure—is key.

In that particular response, the hardest thing to do was gain concurrence with your options—creating consensus

from varying perspectives is always a formidable challenge. Event management—addressing the politics—requires both capacity and resources. You need the capacity in your staff to manage the influx of increased attention, but you also need resources to respond externally to issues that may crop up.

When you effectively manage the event, you are able to address the public's concerns and reduce their "outrage." Less outrage can shorten the response significantly. This is why outreach is so important in the initial hours.

In closing, to quote *The Hitchhiker's Guide to the Galaxy*: "Don't panic!" If there's one thing about a crisis—you want to be in control. Initially, there will be lots of moving pieces. There will be things you've seen and some things you have never seen. Do not let the size and sheer enormity overpower you.

"Don't panic!"

—*The Hitchhiker's Guide to the Galaxy*

As the crisis unfolds, take a minute to assess the situation and move forward. Define what you know and what you do not. Ask yourself: "What have I seen before? What is familiar? What is totally unfamiliar?"

Assemble a core team to help you. Identify your key stakeholders and get them involved early. Remember the difference between the incident and the event; you'll need to manage both. It is crucial not to let the event overwhelm you.

RDML Meredith Austin is the commander of the U.S. Coast Guard Personnel Service Center. Previous assignments include serving as chief of staff of U.S. Coast Guard District 14, and commander of Sector Delaware Bay, the Pacific Strike Team, and the National Strike Force Coordination Center. She is a graduate of the United States Coast Guard Academy, and she holds an M.S. in public health in industrial hygiene from the University of North Carolina-Chapel Hill and an M.A. in homeland security from the Naval Postgraduate School in Monterey, California. RDML Austin is a NIMS-certified Type I incident commander, and has earned the designations of certified industrial hygienist and certified emergency manager.

LT Christopher Kimrey is the assistant chief of Incident Management U.S. Coast Guard Sector San Francisco. He has 16 years of diverse all-hazard response experience, ranging from major hurricanes to seven of the most recent major oil spills in U.S. history and holds NIMS certifications as Type 1 operations and Type 2 planning chief.



The Incident Command System

A historical perspective.

by Ms. KRISTY L. PLOURDE
*Incident Command System Training Coordinator
 U.S. Coast Guard*

MR. RON CANTIN
*President
 Emergency Management Services International Inc.*

There we were ... trying to manage the complexities of a multi-agency, nationally significant response effort—using our own Coast Guard-centric approach to organization and operational execution. To those of you with enough gray hair, this may sound familiar, since during the 1980s and 90s, there were several major incident responses that fit that description.

What we learned from these responses was that our approach needed help in several key areas. We needed:

- a more seamless multi-agency integration model;
- a way to better coordinate operational planning and tactical execution;
- a system to better manage and synchronize all incident resources;
- a common understanding of the incident situation;
- a consistent and repeatable approach that all participants understood, no matter their affiliation.

For many of you, the answer seems obvious—the Incident Command System! Not so fast. Remember, the Incident Command System or ICS, was only created in the mid-1970s, primarily to manage large-scale land fire response.

When a Fire Isn't Just a Fire

But, fortunately, Coast Guard personnel realized that, although managing wild land fires was pretty far removed from typical Coast Guard mission areas, the processes used had many similarities to the responses the Coast Guard often faced.

For example:

- there were multiple agencies involved;
- they needed coordinated operational planning and tactical response management;

- they had to manage the status and activities of hundreds to thousands of resources from all over the country;
- they had to manage information in a coordinated way;
- they needed a consistent, repeatable system.

Coast Guard members, including National Strike Force (NSF) personnel, started a “grassroots” effort to use the ICS in the early 1990s, and the seed was planted.

ICS Takes Root

In 1991, Coast Guard Marine Safety Office (MSO) Puget Sound managed a collision case involving a fishing vessel and a container vessel using the ICS, and the NSF assisted them the following year using the ICS in other responses.

MSO Detroit used the Incident Command System for a major pollution response exercise between the United States and Canada on the Detroit and St. Clair river system in Michigan. This ICS experience proved invaluable, as MSO Detroit soon after that needed to deal with a tank ship loaded with gasoline that caught fire in Bay City, Michigan.¹

The Coast Guard Takes the Lead

Like an incoming tide, Incident Command System use within the Coast Guard throughout the 1990s touched every corner of the service. Responders recognized the value of the system in bringing order to chaos right from the outset of an incident. It became a matter of routine at some Coast Guard units, even for small-scale responses.

As time went on, ICS use increased within the Coast Guard. Since the National Strike Force had a higher level of ICS knowledge and experience, Coast Guard leaders created an NSF cadre of ICS instructors to teach ICS-200 and ICS-300 courses throughout the U.S. Moreover, Coast Guard

Training Center Yorktown began to offer ICS courses; a Commandant instruction in 1996 directed ICS use for oil and hazardous materials response; and, in 1998, another instruction required ICS use for all hazards.

Once the National Response Framework was established, with its requirement for all federal agencies to utilize the ICS, it was clear the Incident Command System was here to stay.

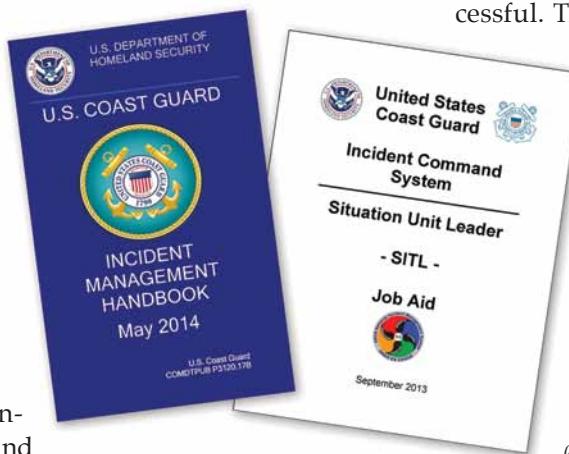
ICS Tools

The National Strike Force has always been a player in ICS tools development. For example, NSF members developed Coast Guard ICS forms, job aids, and the Coast Guard Oil Field Operations Guide, a precursor to the CG Incident Management Handbook, released in 2001.

Where we are Going

The Coast Guard has and will continue to grow in its Incident Command System use. For example, the 2014 Incident Management Handbook has even more tools for the ICS responder. In addition, the Coast Guard now has exceptional job aids for all command and general staff positions and some key unit leader positions.

The Coast Guard is also delivering position-specific courses for all command and general staff and key unit leader positions and has a robust certification system.



We have created additional forms to assist the responder in documenting ICS processes, like the ICS-213RR, the resource request form that aids in resource request processes or the ICS 202A, which is a tool for the incident commander/unified command to document key decisions, priorities limitations, and constraints.

While ICS execution may not be perfect, responders who use it believe that without the Incident Command System, their response would have been more chaotic and less successful.

The system provides an orderly structure, accountability, and common communications to help any responder and will continue to be the systematic tool for emergency response command, control, and coordination.

About the authors:

Ms. Kristy L. Plourde is the USCG's Incident Command System training coordinator. She has more than 35 years of military and civilian Coast Guard experience and has served as the CG FOSCR/incident commander, operations and planning section chief, and in other ICS roles during large incident responses.

Mr. Ron Cantin is the president of Emergency Management Services International Inc. He is a 27-year Coast Guard veteran who served two tours of duty as a senior member of the National Strike Force and was the commanding officer of the Gulf Strike Team from 2005 to 2007. He holds certifications for numerous Type I and Type II ICS positions and was the first Coast Guard member to certify as a Type I incident commander.

Endnote:

¹ See <http://incidentnews.noaa.gov/incident/6755>.

Beyond Complexity

Leadership in support of the on-scene coordinator.

by LCDR JEFFREY RUBINI, CEM
*Supervisor, 11th District Response Advisory Team
U.S. Coast Guard*

Gone are the days when incidents were “just” hurricanes, oil spills, outbreaks, ship wrecks, or tsunamis. We now live in a global community whose members, even if they are not directly impacted, have a stake in incident response and resolution. The days of isolated response have past, as we have ushered in a new era of community and whole-of-government response to complex incidents.

We are thus compelled to achieve results at new levels of public expectations, which requires intellectual introspection to accept personal and organizational limitations. We must also understand how to create and claim new capabilities, capacities, and competencies and know how to apply them through new ways of thinking and leading. The 2004–05 Atlantic hurricane seasons, including the Hurricane Ivan and Hurricane Katrina responses, highlight many of these challenges and inform the demands of 21st century leadership during complex events.

Hurricane Ivan: Prelude to Complexity

Mr. James Bjostad, chief of Emergency Management in Florida’s Lee County, was commander of then-Group Mobile in 2004, when Hurricane Ivan made landfall as a near-Category 4 hurricane.

“You need to bring the specialists, as we’ll always need specific competencies for specific needs and will thus always need the NSF. They are enduring.”

—Admiral Thad Allen
23rd U.S. Coast Guard Commandant

As Hurricane Ivan mounted force, the commanding officer of the Gulf Strike Team (GST), then-Commander Peter Gautier, approached Bjostad with an offer of GST assistance to help organize the response and give it strategic footing. Bjostad, who at the time was unfamiliar with the Gulf Strike Team, asked what Gautier could do. Gautier replied,

“If you’ll let me, I will be your deputy, your counsel, and advise you on the steps to take.”

Gulf Strike Team Assistance

The Group Mobile CO recalls, “I had zero Incident Command System training or experience. I felt like I was taking the final exam while learning the material.” So he gladly accepted GST’s offer.

Gulf Strike Team support included rapid Incident Command System (ICS) training, driving the process to develop an incident action plan ahead of the storm, forming groups of people from disparate organizations into functional teams, and refining the organization chart.

“You need to give a good response, not just a good personal performance. Sometimes you must swallow your pride, be realistic, ask for help, and accept it when offered.”

—James Bjostad, 2004 Group Mobile commander

Bjostad’s experience during Hurricane Ivan would inform his leadership perspective on incident management during high-stress, high-stakes, multi-agency, multi-functional responses. Reflecting on strike team support during Hurricane Ivan, Bjostad notes, “I can’t imagine any operational commander would not ask for their support—so come early and come often!”

Having a trusted and competent core of professionals is what Admiral Thad Allen, 23rd Commandant of the USCG, calls having “dogs that hunt.” Admiral Allen said, “Early in my career, I understood that you need a team around you that brings more capacity. It is crucial to always have a mental list of those to call upon during a crisis, as you need people around you who can give you support. So it’s the people you call on, that you depend on, who show up and do a good job. They’re not personal servants; they’re there

to give honest feedback and to help run the entire organization, and it's critical you have them around."

Hurricane Katrina: 21st Century Complexity

Mr. Frank Paskewich, USCG Sector New Orleans commander during Hurricane Katrina, recognized the value of dogs that hunt, and was aware of the National Strike Force (NSF) and its capabilities. He said, "I never hesitated to call the NSF—it was my alter ego to help me run a response." As such, the relationship Paskewich built with the NSF became central to his leadership during Hurricane Katrina.

Mr. Roger Laferriere, who then commanded the Atlantic Strike Team, worked the response with him. Paskewich said, "We had a fledgling incident command until Roger straightened it out, setting it into a fully functioning organization that handled all missions simultaneously, not just one at a time."

As awareness of the overall devastation evolved, Paskewich learned of multiple large-scale pollution incidents. Paskewich recalls Laferriere's reaction: "We can run that for you; you have plenty on your plate."

"This was one of the best decisions I made—to bring in the experts and let them run the show."

—Frank Paskewich
2004 Sector New Orleans commander



Capt. Frank Paskewich, commander of Coast Guard Sector New Orleans, looks out over the ravaged Super Dome after Hurricane Katrina. U.S. Coast Guard photo by Petty Officer Luke Pinneo.

as thousands of smaller discharges from marine facilities, pipelines, refineries, storage tanks, and vessels. In total,

Paskewich was hesitant, as there was little precedent for designating an incident-specific federal on-scene coordinator (FOSC) from the NSF to run a pollution response of this size. But he gave the NSF incident-specific FOSC designation, handing them the authority to carry out the USCG's pollution response mandates.

The pollution response stemming from Hurricane Katrina was, as Paskewich puts it, "... the biggest response that no one knew about," and included six major, four medium, and 134 minor oil spills, as well

Complexity and the New Mental Model

Though we are unable to predict just how consequential they are, complex events—the *Exxon Valdez* oil spill, Y2K (the biggest complex event that never happened), the terrorist attacks of 9/11, Hurricane Katrina, the 2010 earthquake in Haiti, *Deepwater Horizon*, the 2011 tsunami in Japan, and the West Africa Ebola outbreak—challenge the very assumptions upon which our laws, regulations, doctrine, policies, and plans are written. Peter Senge, Ph.D., senior lecturer in Leadership and Sustainability at the MIT Sloan School of Management, calls these our "mental models," our ways of viewing or thinking about the world.¹

Leading during a complex event requires a new way of thinking about the world, the event, the management team, and yourself. In short, it means re-thinking our mental models. Our existing mental models are perpetually overrun by complex events, given the rate of increasing complexity. Whereas, intellectual rigor helps to evolve our mental models, applying the wrong one can have impactful consequences.

For example, Admiral Allen, principal federal official for Hurricane Katrina response and recovery, demonstrated that Hurricane Katrina was wrongly characterized as "just" a hurricane. So using existing hurricane response models narrowed our collective thinking, blinding many to the larger complexities and fundamental drivers of response decision making. If those complexities and drivers were understood earlier and if we used the right mental model earlier, then response organizations might have been more capable of producing different incident outcomes.

"This was the equivalent of a weapon of mass destruction, used on the city of New Orleans..."

—Admiral Thad Allen

Using the right mental model requires the ability to diversify and align conceptual portfolios with different yet complementary ways of thinking. This moves us toward a shared mental model that does better to accommodate complexity.

Endnote:

¹. Senge, Peter. *The Fifth Discipline: The Art & Practice of The Learning Organization*.

approximately 8.2 million gallons of oil spilled. That's nearly three-quarters the volume spilled during *Exxon Valdez*, making it the second largest oil spill in U.S. history, prior to *Deepwater Horizon*.

As if that weren't enough, the rest of the problem included managing a 1,000-person response force with no infrastructure, no roads, no lodging, and no support, aligning with individual responsible parties, and setting up contractors for approximately 2,500 square miles of Louisiana bays, bayous, beaches, canals, marshes, rivers, and wetlands.



In Support of the OSC

Admiral Allen's first interaction with the National Strike Force occurred in January 1980, when a disabled tug and barge carrying 3 million gallons of No. six oil ran aground in blizzard conditions north of Atlantic City.

1980 Oil Spill Response

"I was a lieutenant serving as CO of Group Atlantic City, and at that time I was unfamiliar with captain of the port and FOSC authorities. I realized the demands were beyond my capabilities, but I also wanted to optimize my performance, so I asked to serve as the operations section chief. The FOSC had already requested NSF assistance...."

Working alongside then-LT Allen, NSF activities in support of the FOSC narrowly averted an environmental disaster.

Behind the Scenes

RDML Austin's NSF command philosophy took root while serving as a LCDR at Marine Safety Unit Galveston, Texas. While leading a response and working alongside the National Strike Force, she came to believe that keeping the OSC up-front and the NSF in the background maximizes everyone's utility by allowing the unit to run the case, while NSF integrates where needed or directed.

"Always be approachable and collegial, so folks are comfortable coming to you with issues."

—RDML Meredith L. Austin

CAPT Bill Carter, commander, National Strike Force Coordination Center, sees the NSF providing services going well beyond just spill response. He said, "We aim to give those we support peace of mind. If there's a problem, we will solve it.... ."

To address this relatively unknown feature of the entire Hurricane Katrina response, the NSF had to mobilize, be self-sufficient, and handle everything simultaneously, as Paskewich led the rest of his team to confront the human suffering, conduct search and rescue, re-open a paralyzed marine transportation system, re-establish the communications infrastructure, conduct vessel salvage, perform homeland security missions, engage a growing list of stakeholders with different agendas and capabilities, and interact with the 24/7 media.

Lead Others, Lead Thyself

Bjostad's more personal lessons included how to manage yourself amid the stress of a complex event.

It is thus imperative, says Bjostad, that "you maintain control and collegiality. The incident command post, for example, must be a sanctuary of focused effort and as incident commander you must remain calm and cool when all hell breaks loose."

While an incident leader may not know how to solve all challenges or problems, he or she must know how to leverage resources, admit limitations, and call for help. Bjostad notes, "Leaders who are full of hubris are found out pretty quickly and they make themselves irrelevant by 'winging it,' which is inefficient and creates a lack of focus."

The NSF aims to provide the right mix of cognitive and tactical tools to achieve precision management in pursuit of successful incident outcomes. Noting a shift in how success is measured, RDML Gautier, the current U.S. Coast Guard director for Governmental and Public Affairs, suggests, "Success is measured in the public domain by the amount of confidence gained by the public, as well as the amount of confidence gained by our respective leadership."

The decisions Bjostad and Paskewich made during their response to hurricanes Ivan and Katrina demonstrate strength in leadership, as well as an understanding of how to build unity of effort—the universal challenge of any response, through authentic stakeholder involvement. For them, one way to lead was accessing NSF utility. As Paskewich notes, "The NSF understands conceptually what needs to occur to achieve full-spectrum dominance during response. I hope organizations cultivate more of that capability; that is, having people with unique recognition skills who can keep things in context and connect dots across the organization, and see when things are not right."

About the author:

CLCDR Jeffrey Rubini is the USCG's 11th District Response Advisory Team supervisor and Marine Environmental Response program manager. He served from 2002–2005 as the Gulf Strike Team's Assistant Operations Officer, Hazardous Materials Response Department head, training officer, and as a National Strike Force response officer.

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Editor's note: Some of the incident statistics and information in this article come from internal Coast Guard reports and may not be available online.

Acknowledgement

The narrative is informed by some of the most proven and inspirational leaders within industry, academia, and government. I had the great privilege of speaking personally with Admiral Thad Allen (USCG, ret.); Rear Admiral Meredith Austin; Rear Admiral Peter Gautier; Captain Bill Carter; James Bjostad (Captain, USCG, ret.); Frank Paskewich (Captain, USCG, ret.); James Elliott (Commander, USCG, ret.); Professor Kathy Newcomer of George Washington University; and Professor William Waugh of Georgia State University.



Calling in Reinforcements

Coast Guard surge support.

by MR. KEVIN SLIGH
Chief

U.S. Coast Guard Incident Management and Cross Contingency Division

LCDR ROBERT GORE
Branch Chief
U.S. Coast Guard Incident Management Policy

Throughout its 40-plus years, the National Strike Force (NSF) has supported Federal Emergency Management Administration (FEMA) response to man-made or natural disasters. While Coast Guard sectors and marine safety units are not designed to manage a large catastrophe alone, units are expected to be self-sustaining for the initial 72 hours of an incident. Thereafter, units can draw from resources, including the NSF, the marine transportation recovery unit, district response advisory teams, emergency preparedness liaison officers, and the Incident Management Assistance Team.

Coast Guard Policy

In support of the federal interagency, the Coast Guard provides personnel to staff elements of the National Response Coordination Center (NRCC) under the Coast Guard's connectivity to the National Response Framework.

From a statutory standpoint, Coast Guard operations are typically focused on maritime emergencies. Events involving a Stafford Act declaration¹ and subsequent state or federal agency requests for Coast Guard assistance require special attention. FEMA personnel will issue a mission assignment to meet urgent immediate and short-term needs of a state that is unable to provide resources necessary to save lives or protect public health, public safety, and property.

When states or other agencies recognize a need for assistance, they communicate that need to the appropriate regional response coordination center, joint field office, or the National Response Coordination Center. Coast Guard representatives then coordinate mission assignments with the appropriate district commands, areas (or the operational commander), or their delegated command personnel.

Occasionally, the NRCC will issue mission assignments at the national level. For these cases, Coast Guard liaisons in the NRCC coordinate mission assignment requests with Coast Guard headquarters and the areas to determine adequate surge support capacity.

Hurricane Ike, 2008

In September 2008, Hurricane Ike made landfall in the Houston-Galveston, Texas, area with maximum sustained winds exceeding 100 mph. The initial storm surge was up to 25 feet in some coastal areas, leading to numerous search and rescue cases, displacing or destroying more than 50 percent of aids to navigation, and generating more than 250 pollution reports.

Prior to landfall, Coast Guard Sector Houston-Galveston surged more than 40 of its organic personnel to San Antonio, Texas, in anticipation of search and rescue, waterways management, and environmental response missions.



A Coast Guard C-130 J flight crew load a FEMA response vehicle. U.S. Coast Guard photo by Petty Officer Christopher Evanson.

In addition, Houston-Galveston personnel worked with FEMA, the National Pollution Funds Center, and the NSF to pre-position strike team personnel under a pre-scripted mission assignment.

During the response, Coast Guard personnel partnered with the EPA, Texas Grants Land Office, and the Texas Commission on Environmental Quality.

Strike team personnel surged to support the unified command on several major oil spills, hazardous materials release from intermodal containers, and pollution threats from hundreds of vessels.

The Coast Guard also provided nine members to a joint field office to coordinate the ESF-10² portion of the response and eight personnel from the now disestablished Deployable Operations Group. In addition to those surge forces, Sectors Upper and Lower Mississippi River deployed their district response advisory teams for flood response operations.

Hurricane Sandy, 2012

In October 2012, Sandy became a mild Category 1 hurricane off the coasts of Georgia, South Carolina, and North Carolina. Eventually, as the storm moved northwest, a high pressure and cold front to the north added to its fury, and Sandy caused catastrophic damage along the New Jersey, New York, and Connecticut coasts. In more bad news, a full moon, which enhanced tides, helped to produce a disastrous storm surge.

Coast Guard First District and Sector New York commanders dispatched various elements to perform traditional Coast Guard missions. Eventually, as the response transformed into a whole-of-government response, Coast Guard senior leadership realized the need to bring in various types of reinforcements for the long-term response and recovery efforts.

The Coast Guard liaisons assigned to local, state, and federal emergency operations centers in the area requested reinforcements that included a NSF strike team capable of dewatering the Brooklyn-Battery Tunnel, which connects the Borough of Brooklyn with the Borough of Manhattan, and personnel to help re-open local ports and perform aids

to navigation surveys. Western rivers sectors also deployed disaster assistance recovery teams in support of FEMA, the U.S. Army Corps of Engineers, and the state of New Jersey.

The Take-Aways

The Coast Guard's connectivity to the National Response Framework was strikingly clear during these responses. Local and regional Coast Guard units demonstrated their ability to plan for and execute disaster response plans for the first 72 hours, then subsequent reinforcements plugged any gaps for a national response and long-term recovery.

Incident management and crisis response are critical functions that span all Coast Guard missions. Locally based, nationally deployed, and globally connected, the Coast Guard is uniquely positioned to respond to and lead incidents within the maritime domain. Whether a search and rescue case, oil spill, security event, marine transportation disruption, or any other maritime disturbance, the Coast Guard is ready to respond to ensure the safety, security, and stewardship of the nation's waters.

About the authors:

Mr. Sligh served in the U.S. Navy and Coast Guard for more than 24 years, including two tours within the National Strike Force and a tour as Deployable Operations Group NSF force manager. Since his retirement, he has supported Coast Guard headquarters as a program manager within the Office of Marine Environmental Response and currently as the chief, Incident Management and Cross Contingency Division.

LCDR Robert Gore is the Incident Management Policy branch chief at Coast Guard headquarters. He has served in the U.S. Coast Guard for 17 years, in capacities including National Strike Force oil spill response organization program manager, Sector Hampton Roads Incident Management Division chief, and in the Incident Management Advanced Education Program, where he earned his MPA in emergency management.

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Editor's note: Some of the incident statistics and information in this article come from internal Coast Guard reports and may not be available online.

Endnotes:

¹ The president makes a Stafford Act declaration following the request from a governor to provide federal assistance to state and local responders.

² Emergency Support Function 10—Oil and Hazardous Materials.



We're Not in Kansas Anymore

International response efforts.

by CDR KEVIN LYNN
Commanding Officer
U.S. Coast Guard, Gulf Strike Team

Late evening, on Jan. 16, 2001, just offshore from the Galapagos Islands, an ominous situation developed. Aground on a reef sat a tank vessel, laden with 200,000 gallons of petroleum products. During the next several days, the situation turned from ominous to catastrophic, as most of the oil spilled into the ocean and affected the delicate and diverse ecosystem of the Galapagos Islands.¹

In response, the National Strike Force dispatched 10 members from the Gulf Strike Team to assist the Ecuadorian government with oil spill and vessel salvage operations.

The National Strike Force Then and Now

Just as it was then, the National Strike Force remains poised today to respond to situations of interest domestically and internationally—be it an oil spill, hazardous materials release, or any other disaster.

While many nations have robust capabilities to deal with environmental disaster consequences, others may need assistance in areas such as incident management or response equipment operation. Moreover, incidents that occur beyond U.S. waters may still affect our waters, due to prevailing currents or other environmental conditions.

Regardless of the scenario, there is a compelling need for the National Strike Force to maintain a worldwide deployable capability and to stand ready to protect people, property, and the environment.

Response Governance

Much has been written within the international domain that pertains to response planning and operations. The

1995 International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC) provides the global framework for signatory nations to follow in preparing and responding to oil spills.² OPRC covers specific shipboard planning requirements, linkages to national response systems, pollution incident reporting, exercise program administration, spill response equipment acquisition and maintenance, and mechanisms to provide assistance during a pollution emergency.³

Regionally based protocols, such as the Cartagena Convention, also supplement the OPRC. This convention, which has been ratified by 25 United Nations member states, provides measures to tackle pollution incidents from ships, dumping, seabed activities, land-based activities and other sources.⁴ Other documents, including the Caribbean Island OPRC Plan, Wider Caribbean Region Multilateral Technical



Chief D.J. Toll (front left), one of 10 Gulf Strike Team personnel sent to the Galapagos Islands to assist with oil cleanup. U.S. Coast Guard photo by PACS Tod Lyons.

National Strike Force Capabilities

Worldwide Deployment

- **Atlantic Strike Team**—Europe, Middle East, eastern Canada, Virgin Islands, Puerto Rico, Africa
- **Gulf Strike Team**—South America, Central America, eastern Mexico, Caribbean
- **Pacific Strike Team**—Asia, Arctic, Antarctica, western Mexico, western Canada

Highly Skilled Cadre of Professional Responders

- incident commanders
- operations, planning, finance, and logistics section chiefs
- safety officers
- oil spill, hazardous materials, and salvage technicians

Air-Deployable Response Equipment

- vessel damage assessment kits
- oil and chemical pumps, hoses, and temporary storage devices
- viscous oil pumping
- oil skimming systems
- alternative response monitoring for *in-situ* burns and dispersant application

Operation Procedures (WCR MTOP) for Offshore Oil Pollution Response, and bilateral agreements among the United States, Mexico, and Canada further define procedures, expectations, logistical arrangements, and cooperative efforts for environmental response operation.

Within the U.S., the National Contingency Plan (NCP) guides government involvement in response operations. This plan, coupled with other regulations (such as those that require developing and testing vessel and facility oil spill response plans), provide the principal authorities and linkages necessary to mount an appropriate response.

Unified Command Elements

The concept of a unified command is explained within the National Incident Management System. When the U.S. has clear jurisdiction, such as when an incident occurs within a port area, the structure is clear—the U.S. Coast Guard provides national representation, state and city governments

provide regional and local representation, and the responsible party provides “ownership” representation.

When it comes to international engagement, the term unified command may take on a different meaning. If the incident occurs outside of U.S. jurisdiction, responders must determine whether or not the spill threatens U.S. waters. If there is potential impact, the U.S. may staff a response organization. In this instance, responders will likely create two separate and distinct unified commands—one for the foreign government and one for the U.S.

This can become problematic if there is not a coordinated approach to the incident management process. While a singular incident management organization is typically desired, achieving this may not be physically possible or politically practical. In the event multiple unified commands are established, incident commanders must consider how they will be linked.

One solution is to employ liaison officers. However, when deploying a liaison or team to another country, it is important to set expectations for those personnel, including any authorities they may exercise on behalf of their government, briefing schedules to their chain of command, and critical or emergent notification criteria such as major successes or setbacks.

Organizing the Response

Of course, the ultimate goal of any operation is to mount the best response, and doing so requires a unity of effort. Applying the term “unity” to a situation where there are two separate unified command structures seems contradictory, and it will be if there is no coordination.

Building upon a scenario where there are two separate unified command organizations, but linked through liaison teams, we add one more twist—responders have determined a threat to U.S. interests. Now, the responsible party must answer to two governments. How is unity of effort and a best response achieved in such a complicated scenario? Much of that answer lies in how well the two command structures interact with each other.

Under the National Incident Management System, there is a dedicated planning process that allows the unified command to set response objectives that drive response strategies and tactics. In a case where there are multiple unified commands and distinct geographic boundaries, it may make the most sense to set complementary objectives.

Envision an uncontrolled spill from a subsurface well, with large quantities of oil affecting open ocean areas. In



a less-than-desirable situation, responders establish two unified command structures, but do not employ liaisons teams. So it's possible that each incident management structure is directing the responsible party to take contradictory actions. However, if there is a strong linkage between the two unified commands, early discussions could, for example, yield a proposal for the nation where the incident occurred to focus on source control, open water recovery, and coastal protection and recovery, while the other nation focuses on open water response actions.

Requesting Support

So how can the National Strike Force help? Fortunately, we have exercised protocols for handling responses to requests for international assistance for large- and small-scale incidents. While documents such as bilateral agreements and the WCR MTOP provide specific procedures, the process is fairly straightforward. To request U.S. assistance, foreign government representatives typically transmit a diplomatic note through the U.S. embassy.

Once the request is submitted, personnel transmit it to the State Department, which will, in turn, contact Coast Guard headquarters. From there, internal processes identify available resources. Assuming the appropriate resources are available, personnel must also identify funding, which is usually the burden of the requesting country. Finally, we send correspondence back to the requesting country through diplomatic channels and mobilize resources. While this is the basic process, unique circumstances may influence how each individual case is prosecuted.

As a parting note, if it is determined that no threat exists to U.S. interests, this does not necessarily mean that a response



U.S. Coast Guard Chief Bridgette Brown, a marine science technician with the Coast Guard Atlantic Strike Team, assesses pier damage outside Port-au-Prince, Haiti. U.S. Coast Guard photo by Petty Officer Brandon Blackwell.

will not be mounted. There have been situations where a physical response could not be supported, we still rendered technical advice and offered strategic and tactical response options by telephone or email.

About the author:

CDR Kevin Lynn has served in the U.S. Coast Guard for 17 years. His experience was derived from assignments in the Port Operations and Response departments of Coast Guard units.

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2. *International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)*, International Maritime Organization, 2014. Retrieved from [www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-on-Oil-Pollution-Preparedness,-Response-and-Co-operation-\(OPRC\).aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-on-Oil-Pollution-Preparedness,-Response-and-Co-operation-(OPRC).aspx) on 21 JUL 2014.
3. *Ibid.*
4. *About the Cartagena Convention*. 2014 Caribbean Environment Programme, retrieved from www.cep.unep.org/cartagena-convention.

Incident Management and Crisis Response

A collective approach.

by CAPT JOSEPH GLEASON

Chief

U.S. Coast Guard Office of Contingency Preparedness and Exercise Policy

CDR JASON GUNNING

Prevention Department

U.S. Coast Guard Sector Long Island Sound

In today's response environment, the performance expectations and stakes are high. Following *Exxon Valdez*, 9/11, Hurricane Katrina, *Deepwater Horizon*, and Hurricane Sandy, we have seen a continuous growth in the expectation for unified, government-wide, collective incident response.

Long gone are the days when response is limited to tactical mission execution. With a 24-hour news cycle and increased

information demands from agency and elected officials, Coast Guard operational commanders must be actively engaged in directing operations, public messaging, and keeping senior leaders informed.

Response Efforts from Capitol Hill

New laws, directives, and federal doctrine support these increased expectations. For example, in 2003, President Bush signed Homeland Security Presidential Directive 5—Management of Domestic Incidents, which required federal agencies to use the National Incident Management System and the Incident Command System for domestic response.

After Hurricane Katrina, Congress passed the Post Katrina Emergency Management Reform Act, which returned responsibility for disaster response and preparedness to the Federal Emergency Management Agency (FEMA) and reinforced FEMA's role as the lead agency for disaster response. Many witnessed firsthand the high expectations for removing oil and protecting the environment during the response to the *Deepwater Horizon* oil spill, the first spill of national significance.

In 2011, President Obama signed Presidential Policy Directive 8 (PPD-8), which refers to national preparedness as the actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the nation's security. In support of PPD-8, DHS has published five frameworks that outline coordinating efforts for each national preparedness mission area—prevention, protection, mitigation,

Best Practices for Leaning Forward

- Know your plans.
- Invest in training.
- Establish external relationships through preparedness activities.
- Engage Coast Guard leadership and provide direction for the scale of the crisis.
- Request resources to augment staff.
- Bring in specialized teams when needed.
- Pre-stage resources if possible.
- Provide liaisons to external EOCs and operations centers.
- Review lessons learned.
- Plan ahead for demobilization and sustained operations.
- Have an effective communications strategy.
- Take care of your people.
- Take care of yourself.





The preparedness cycle. U.S. Coast Guard graphic by CDR Marty Sarch.

response, and recovery. In 2014, FEMA published federal interagency operational plans that support each framework. These documents establish strong congressional and presidential expectations that the federal government will lead a well-coordinated, effective interagency response with state, local, tribal, and territorial governments to effect the best outcome.

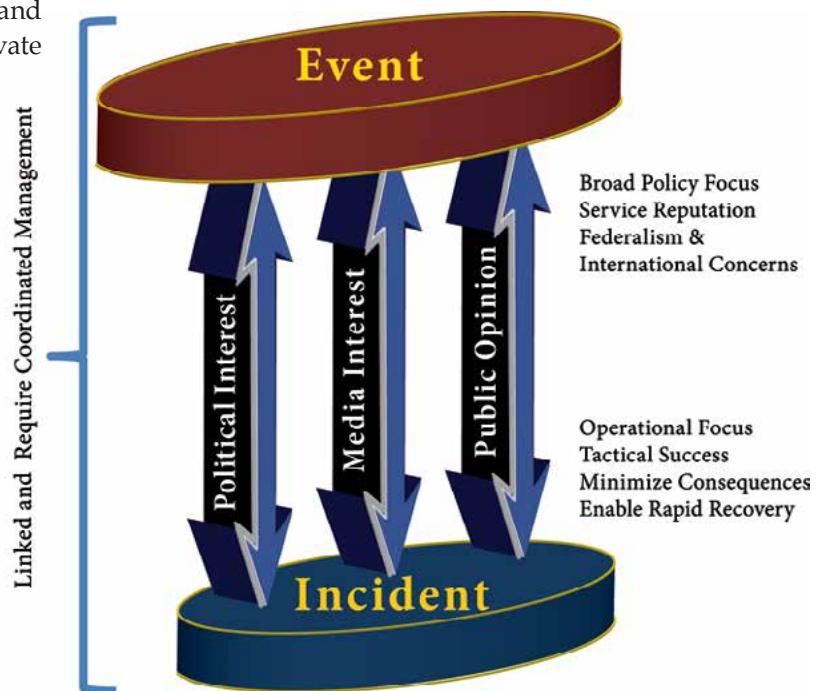
In many regards, the Coast Guard is well prepared to meet these increased expectations, as the Coast Guard regularly works closely with federal, state, local, territorial and tribal partners; non-governmental agencies; and the private sector to carry out coordinated responses to myriad events and disasters. The service's field units have a long-established history of coordinating activities with regional and local stakeholders through harbor safety committees, area committees, and area maritime security committees, which fosters the critical relationships needed for successfully responding to incidents and crises, while meeting the high public expectations. In addition, in June 2014, Coast Guard Commandant Admiral Paul Zukunft released Coast Guard Publication 3-28, Incident Management and Crisis Response.

Response Preparation

Responding to an incident requires tactical operations as well as effectively communicating with the public, media, and senior governmental leaders. Moreover, operational commanders must develop plans, train personnel, and improve proficiency through preparedness activities to ensure they are always ready to respond.

The Preparedness Cycle

- ✓ **Plan:** Create and maintain contingency plans in association with local, state, regional, national, international, and tribal stakeholders.
- ✓ **Organize and equip:** Identify the personnel and resources necessary for a successful response. This includes pre-identifying required competencies and skill sets, depending on the incident. Equipping means acquiring the equipment needed for response operations and coordination.
- ✓ **Train:** Ensure personnel are provided appropriate training for fulltime and collateral duties. Incident management requires training in the Incident Command System, crisis management, and leadership. Personnel must also have training to ensure the technical proficiency required for their assigned duties.
- ✓ **Exercise:** Units at all levels of the Coast Guard conduct realistic interagency, joint, and internal exercises to validate plans, identify gaps, and develop improvements.
- ✓ **Evaluation and Improvement:** Evaluating incident responses and exercises helps the Coast Guard identify best practices, gaps in policy, and opportunities for improvement. After-action reports recognize best practices and lessons learned from past responses to improve future response. Coast Guard incident-specific preparedness reports also give valuable insight into previous challenges. The after-action information and lessons learned system database holds best practices, trends, and information that can improve contingency plan development.



Incident and event correlation. U.S. Coast Guard graphic by CDR Marty Sarch.

Publication 3-28 can help crisis managers, but it is not a “how to” guide. It discusses the breadth of Coast Guard responsibility, roles, capability, and authority to respond, and the primary considerations for leading an effective response to any incident. It also captures lessons learned and leadership principles of incident management into a service-wide doctrinal level document.

Key Publication 3-28 concepts include:

- ▶ **Leaning forward:** Collectively, this means establishing an assertive response posture in advance of an incident, if possible, or early in the response. Leaning forward includes deploying liaisons, engaging community leaders, and the public early with outreach, standing up an incident command post, and requesting resources.
- ▶ **Surge forces:** Units should be ready for an incident that requires somewhere between 50 to 200 responders and may potentially last multiple operational periods. The local unit must handle the initial brunt of a larger incident, but the Coast Guard must be ready to shift resources to support local needs.
- ▶ **Bench strength:** Response is not limited to sector or even district staff. The bench strength for any incident is the entire Coast Guard, such as was seen during *Deepwater Horizon*. Deployable specialized forces such as the Coast Guard Incident Management Assistance Team, the National Strike Force, maritime safety and security teams, dive lockers, and other deployable support elements all stand ready to assist field units and operational commanders when disaster strikes.
- ▶ **Crisis leadership:** Even if the tactical response is well executed, poor “event” management can have a real impact on tactical actions. Different levels of the organization may need to respond in different capacities to different aspects of the response. Understanding the

environment, seizing the narrative, building consensus, using the whole team, and planning transitions are all part of crisis leadership that go with an effective, well-executed tactical response.

- ▶ **Preparedness:** Like preparing a cutter for sea or a helicopter for flight, preparing for a crisis is difficult and requires constant attention. Preparedness is not a static state; only by following the preparedness cycle—plan, organize/equip, train, exercise, and evaluate/improve—can an organization achieve continual improvement in response capabilities.

Response to any emergent incident is a complex challenge requiring trained, experienced, highly capable personnel, dedicated resources, and exceptional plans.

The Coast Guard motto “*Semper Paratus*” describes a commitment to preparedness and a continuous investment in preparedness activities that ensures our future readiness to meet unexpected challenges.

About the authors:

CAPT Joseph Gleason is the chief of the Office of Contingency Preparedness and Exercise Policy at Coast Guard headquarters. He holds four advanced Incident Command System certifications, including Type 1 planning section chief, Type 1 operations section chief, Type 1 liaison officer, and Type 2 incident commander. A career response officer ashore, his previous assignments include acting director of Contingency Planning and Incident Management Division at the DHS Office of Infrastructure Protection, commanding officer of Marine Safety Unit Cleveland, and exercise officer for the Deployable Operations Group. CAPT Gleason holds a master’s degree in public administration and is a master exercise practitioner.

CDR Jason Gunning is the chief of Prevention at Sector Long Island Sound. Previously, he was the acting division chief of the Incident Management and Cross Contingency Division. He was also the executive officer of Marine Safety Unit Lake Charles and a marine inspector at Activities Europe and Marine Safety Office Houston-Galveston. CDR Gunning holds a master’s degree in public policy from Texas A&M University.



Today's IMAT

Ready to assist with incident management

by CAPT ANTHONY LLOYD

Commanding Officer

Coast Guard Incident Management Assistance Team

The Coast Guard Incident Management Assistance Team (CG-IMAT), commissioned in August 2013, provides highly trained personnel who are ready to assist with major incident management activities. It has four distinct responsibilities:

- **Incident management:** The CG-IMAT is a Type-1 Incident Management Assistance Team. Deployments include individuals, four-person away teams, 15-person deployable elements, or the entire CG-IMAT.
- **Training support:** It assists the Coast Guard's Force Readiness Command (FORCECOM) with Incident Command System (ICS) training and certifies individuals in position-specific qualifications.
- **Exercise support:** The CG-IMAT can employ specific personnel to assist in pre-exercise training, planning, execution, and evaluation.
- **Field unit readiness assessment:** The CG-IMAT assists FORCECOM's efforts to standardize field capabilities and enhance unit readiness.

All Hazards, All Risks

The CG-IMAT includes four departments (command, operations, planning, and logistics), which provide multiple individuals or away teams to support operational commanders, or up to two deployable elements capable of responding to two simultaneous Type 1 or Type 2 incidents.

The IMAT can deploy a four-to-six-person away team within six hours of a request. An additional 11 members (to staff the full 15-person deployable element) can be ready to deploy within 12 hours, with the remaining members ready to deploy within 24 hours. Personnel can then follow up an initial deployment with advice on "right-sizing" any incident or ICS organization.

IMAT Mission Statement

Assist our customers to prepare for, respond to, recover from, and mitigate the effects of all risks and all-hazard incidents and events.

Results

During its first year the CG-IMAT assisted personnel from Coast Guard headquarters, other government agencies, Azerbaijan, the Bahamas, and the Panama Canal Authority.

The team logged 3,651 workdays:

- ✓ responding to six incidents, including three large oil spills;
- ✓ conducting nine ICS workshops;
- ✓ participating in 30 exercises;
- ✓ providing adjunct instructors, coaches, and subject matter experts for 39 ICS courses.

As we continue to support our customers, we need to keep their perspectives in mind. It is critical that we meet them where they're at, as we move into assist.

About the author:

CAPT Anthony Lloyd is the commanding officer, Coast Guard Incident Management Assist Team. Previous command tours include commanding officer of the National Maritime Center and commanding officer of the Pacific Strike Team. CAPT Lloyd has also served as the Coast Guard's program manager for incident management and marine environmental response; executive officer, alternate captain of the port, and federal on-scene coordinator at Marine Safety Office Memphis; and operations division chief at the National Strike Force Coordination Center. A graduate of the U.S. Coast Guard Academy, CAPT Lloyd earned a master's degree in national security and strategic studies and holds a National Incident Management System, Incident Command System Type II incident commander and Type I liaison officer certification.

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CG-Incident Management Assistance Team's Final Operating Capacity Team Project, October 23, 2014.

For more information:

See IMAT's website: www.uscg.mil/lantarea/cgimat/ for CG-IMAT progress and ongoing work.



Lessons Learned



Lessons Learned

Gathering Facts, Investigating Incidents, Preventing Casualties

Lessons learned from
an oil spill response perspective.

by Mr. ROBERT VANZANDT

*Chief, Exercise Evaluation and Analysis Division
U.S. Coast Guard*

by MR. SCOTT LUNDGREN

*Deputy Chief and Technical Advisor
Office of Marine Environmental Response Policy
U.S. Coast Guard*

In this section of *Proceedings*, we usually report on the lessons learned from a specific marine casualty. This issue's section looks more generally at the process of how lessons are integrated from the response to the consequences from marine casualty events and other maritime incidents, with a particular focus on marine environmental response, as the primary mission area for the National Strike Force.

While the marine casualty investigation looks to identify root causes and recommend systemic adjustments to prevent future casualties, the dynamic and unforgiving nature of our oceans, rivers, and lakes means that maintaining a honed response capability for a wide variety of maritime contingencies is important, even while recognizing: "An ounce of prevention is worth a pound of cure."

Casualty investigations, mishap analysis boards, responding unit after-action reports, and individual observations by persons involved or affected by the casualty can all contribute to a body of



Vessels conduct controlled burns as part of a coordinated effort to minimize the amount of oil in the water near the Deepwater Horizon oil spill site. Coast Guard photo by LCDR Paul Rooney.

knowledge referred to as "lessons learned." This is reinforced by the belief that individuals and organizations naturally want to improve their performance and not repeat the events that led to a particular casualty or repeat mistakes that affected the casualty response.



The term “lessons learned” is often used to describe the belief that a unit, organization, or industry sector will take advantage of the learning opportunity presented by the sequence of events leading up to a casualty and/or the response to that incident to improve prevention, preparedness, and response for future events.

“Lessons learned” requires that personnel develop and utilize three key elements:

- processes and procedures that provide the framework for exercise and post-incident assessments and reports that inform response plan development;
- processes and procedures that assign the responsibility for corrective actions identified in the post-casualty and exercise reports and for follow-up to ensure the corrective actions are accomplished;
- an information management system that enables users to store and retrieve the lessons-related material, facilitates corrective action management and oversight, and supports long-term analysis to identify trends or recurring problems.

The Preparedness for Response Exercise Program

Within the marine environmental response mission, the national Preparedness for Response Exercise Program (PREP) provides a mechanism for the oil industry and government responders to jointly prepare for response through continual response system improvement.

Exercises are critical to maintaining and improving preparedness in this mission area, even as preventing pollution incidents is an underlying goal for all entities involved.



A Coast Guard aviation survival technician instructs students on how to properly enter a rescue basket, incorporating lessons learned. U.S. Coast Guard photo by Petty Officer Ryan Tippets.

Consequently, PREP exercise lessons learned and recommendations for improvement are captured in after-action reports and catalogued in the Coast Guard Contingency Preparedness System.

Contingency Preparedness Improvement

Coast Guard policy requires that personnel complete an after-action report for all incident responses that are regional or national in scale, or any incident that the operational commander deems appropriate. The Coast Guard also has processes in place for the external review of a pollution incident, called an incident-specific preparedness review or ISPR.

continued on page 90

Searchable Lessons Learned

Using Contingency Preparedness System (CPS) search features, the Coast Guard Office of Contingency Preparedness and Exercise Policy has developed lessons learned extracts to inform operational commanders and decision makers of the lessons learned from similar events. These extracts serve not only to inform the emerging response operations, but are a reminder to document the lessons of the emerging event and further enrich the Coast Guard preparedness knowledge base.

CPS enhanced search features also allow users across the Coast Guard to easily search and retrieve information from the lessons learned and remedial action experiences of other units to inform contingency plan development and guide responses to emerging contingency operations.

Additionally, Coast Guard leaders have tapped dedicated Coast Guard collection teams to gather and develop lessons learned and recommended improvements during, and in the immediate aftermath, of major contingency events.

For example, FORCECOM exercise support team assets were redirected from exercise planning and evaluation activities to gather lessons learned in the *Deepwater Horizon* and Hurricane Sandy responses. Since the dedicated personnel were able to assemble lessons learned from the Hurricane Sandy response during the response, Coast Guard participants were especially active on the National Security Staff-led Sandy after-action review team that developed the federal interagency after-action report for the response to Hurricane Sandy.

Deepwater Horizon's Legacy

The Deepwater Horizon (DWH) incident produced a plethora of lessons learned—far surpassing any service analysis to date in post-incident corrective actions. And, unlike most Coast Guard contingency responses, the Coast Guard DWH after-action report was far from the only document that provided improvement recommendations.

Separating the Wheat From the Chaff

Seven independent groups published reports; collectively yielding approximately 550 individual recommendations. To ensure the service focused its limited resources to execute the most meaningful improvements, USCG leadership involved senior marine environmental response program representatives and professionals from other disciplines to group and prioritize the recommendations.

Coast Guard personnel then consolidated, prioritized, and implemented the most valuable lessons. Marine environmental response program-specific issues were grouped into “people, policy, and equipment” actions. Additionally, the deputy commandants of Operations and Mission Support formed five thematic initiative teams to address identified overall Coast Guard strategic improvement areas:

- incident management,
- information management,
- strategic communication,
- mission support,
- institutionalizing lessons learned.

These teams reported their progress regularly and concluded their work in summer 2014.

Ongoing Improvement

Other post-DWH key improvements include:

- Hiring a senior executive incident management and preparedness director to provide leadership within the Coast Guard across this enterprise.
- Hiring senior civilian incident management and preparedness advisors to serve in key advisory roles to district commanders and provide consistent leadership at the regional response teams and within the Federal Emergency Management Agency regional interagency steering committees.
- Standing up the Coast Guard Incident Management Assistance Team, a rapidly deployable, scalable resource designed to support response operations across the full spectrum of Coast Guard contingencies.
- Revising the Incident Management Handbook to capture incident management-related lessons.
- Updated area contingency plan job aid guidance, focused on ensuring proper planning for worst-case discharge risks.
- Updating spill of national significance (SONS) response management policy and training and exercise programs to



A mobile offshore drilling unit holds position directly over the damaged Deepwater Horizon blowout preventer as a drillship burns gas brought to the surface through a tube placed into the ruptured drill pipe. U.S. Coast Guard photo by Petty Officer Patrick Kelley.

incorporate lessons on appropriate involvement of leadership in a SONS event.

- Completing an oil and chemical incident annex to the Federal Interagency Operational Plans for the National Response and National Recovery Frameworks that explicitly addresses the relationship between the National Response Framework and National Contingency Plans and how they apply in a range of situations.
- National Response Team guidance on atypical dispersant operations, including subsea and prolonged dispersant application information.
- A Coast Guard and Bureau of Safety and Environmental Enforcement response group continues to enhance the interaction between industry oil spill response plans and the Coast Guard's role as FOSC, as well as other issues at the interface of the industry regulator and government response director.
- Personnel have prototyped a real-time information sharing system—the Next Generation Incident Command System—to integrate information from the field, other governmental agencies, and the responsible party into a real-time common operating picture.
- The Coast Guard External Affairs Manual details implementing surge-capable Coast Guard area commander crisis communication teams and headquarters governance of the external communication organization during a significant incident. Additionally, the Public Information Assist Team was transferred to the CG-IMAT and will continue to serve as a training team and a deployable asset for incident and area commanders.
- The lessons learned collection team was developed as an element of the Coast Guard incident management structure, which reinforces using a dedicated lessons learned collection team in large, complex, and/or lengthy contingency operations.

ISPR teams are drawn from federal, state, industry, and other representatives who are not involved in the response, to study the effectiveness of the area contingency plan and its integration with vessel response plans, facility response plans, and other relevant and applicable plans in effect at the federal, state, and local levels.

Documenting lessons and tracking remedial action success helps to ensure plans, training, resources, relationships, and other factors are improved at the echelon of command that originated the lesson. Other important benefits of having a viable after-action program include using lessons learned to inform emerging contingency response operations, to support policy development and revision, and to increase senior leader awareness of challenges and opportunities for improvement to Coast Guard contingency response operations.

The response operations to maritime incidents are tremendous learning opportunities to improve future preparedness and response capabilities for when they do occur. While the term “lessons learned” is often stated in discussions of marine casualties and contingency events, the key elements described here must be in place and utilized to avoid the mere identification and re-identification of the lessons from these incidents. Having policies, processes, and tools in place, along with an organizational culture and commitment to be an adaptive and learning organization, will greatly increase the likelihood that lessons will be truly learned, and that significant improvements will be achieved in preparedness and response.

About the authors:

Mr. Robert A. VanZandt is the chief of the Exercise Evaluation and Analysis Division, U.S. Coast Guard Office of Contingency Preparedness and Exercise Policy. Mr. VanZandt oversees and manages lessons learned analysis

For more information:

Commandant Instruction 3010.19C describes the situations and deadlines for which to submit contingency event and exercise after-action reports to Coast Guard Contingency Preparedness System, the process by which headquarters program managers review and approve them, and Contingency Preparedness System capability to track remedial actions assigned to improve contingency preparedness.

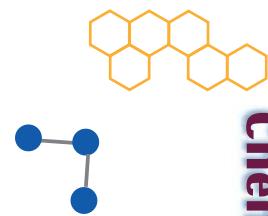
The instruction is searchable and can be used to inform emerging contingency response operations, support policy development and revision, and increase senior leader awareness of challenges and opportunities for improvement to Coast Guard contingency response operations.

Available at www.uscg.mil/directives/ci/3000-3999/CI_3010_19D.pdf.

and corrective action recommendations to document areas for Coast Guard contingency preparedness improvement. Mr. VanZandt is also responsible for Coast Guard policy that guides the Coast Guard after-action program and for maintaining the Coast Guard Contingency Preparedness System.

Mr. Scott Lundgren is the technical advisor and deputy chief of the Office of Marine Environmental Response Policy at Coast Guard headquarters. He also serves as the principal international representative on the International Maritime Organization's International Convention on Oil Pollution Preparedness, Response and Co-operation technical working group and the Arctic Council's emergency prevention, preparedness, and response working group. He previously served as chief of the Coast Guard's Incident Management and Cross Contingency Division, and he holds master's degrees in environmental management from Harvard and in national security and strategic studies from the Naval War College.





Mustard Gas

The lingering threat

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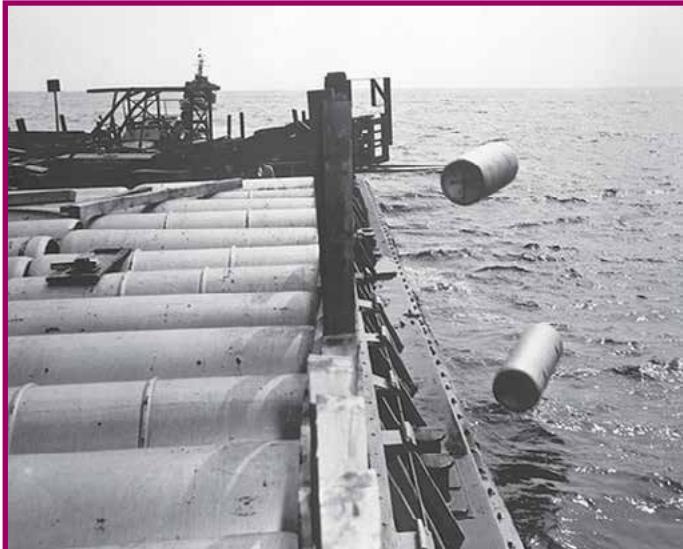
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On July 19, 2004, bomb disposal technicians from Dover Air Force Base, Delaware, were hospitalized for several days, after being exposed to mustard gas. One of the technicians received severe burns. The technicians had been called to disarm a 75-mm artillery shell, found among sea shells dredged off the coast of New Jersey.

On June 6, 2010, while dredging clams south of Fire Island, New York, a fishing vessel crew picked up two artillery shells. A fisherman who handled the shells spilled a black liquid from the shell onto his arm and knee. He initially felt minor heat on his knee and forearm, but did not take any action to clean it off. After a few hours, the exposed areas became painful and developed blisters.

On September 28, 2012, researchers at Texas A&M University located 55-gallon drums at a known chemical weapons dumpsite near the Mississippi River. They suspected the drums were leaking mustard gas.



Declassified Army documents revealed large-scale ocean dumping for chemical and conventional weapons from the World Wars. Weapons included surplus and discontinued U.S. munitions and weapons taken from Germany after World War II. Photo courtesy of the U.S. Army.

History of Chemical Weapon Dumping

The military dumped large quantities of chemical weapons in the oceans from the 1940s to 1970s. The belief was that ocean dumping was a safe means of disposal; however, fishing vessel operations occasionally dredge or recover some of these chemical munitions.

Because mustard gas, in particular, is stable at cool temperatures in sealed containers, it remains a threat, despite its age.

Health Concerns

Although its name implies it is a gas, mustard gas is actually a liquid at room temperature. It is highly lipophilic, meaning it can combine with or dissolve in lipids or fats, allowing it to penetrate the skin, eyes, and lungs of those exposed.

Furthermore, exposure to mustard gas vapors can also cause damage, even if the individual is not directly exposed to the liquid chemical.





The Germans first used mustard gas in World War I. Other than its garlicky odor, mustard gas exposure is not noticeable at first; oftentimes soldiers did not know they were exposed. Dermal exposure results in skin reddening (similar to sunburn) and small blisters, which may then coalesce into very large, painful, fluid-filled blisters. The blisters take much longer to heal than normal blister wounds and may result in skin discoloration and scars.

Exposure to sulfur mustard vapor results in greatest exposure to moist areas of the body, such as the armpits, groin, lungs, and eyes. During World War I, lung exposure resulted in the greatest mortality. Increasing temperatures after daybreak vaporized mustard gas from bombardment the previous night, and the soldiers would breathe it in. This damaged pulmonary tissues, preventing adequate air transfer, and also caused secondary infections that sometimes resulted in death (before penicillin and modern antibiotics).

Understanding Mustard Gas

What is it?

Mustard gas is best known as a chemical weapon primarily used in World War I. It is banned under the Chemical Weapons Convention, signed by the United States in 1993, and administered by the Organization for the Prohibition of Chemical Weapons in The Hague, Netherlands.

Despite its name, the chemical is an oily liquid with a garlicky odor and is insoluble in water. Also known as sulfur mustard, it acts as a severe blistering agent that attacks the skin, eyes, and respiratory tract.

Exposure does not result in immediate pain or discomfort; those exposed often do not realize it until symptoms arise many hours later.

Why Should I Care?

Dangerous weapons that are out of sight can still cause harm. Increased fishing industry dredging also increases the risk of dredging old munitions, some of whose locations are not documented.

What is the Coast Guard doing about it?

The Coast Guard regularly coordinates with multiple state and local agencies to prepare stakeholders to respond proactively to uncommon events, such as discovering old mustard gas canisters.

Once someone in the marine environment has discovered a suspected mustard gas canister or other munition and appropriately informed the U.S. Coast Guard National Response Center, Coast Guard personnel will notify the nearest USCG sector command center.

Federal law has established the U.S. Coast Guard as the primary federal agency tasked with responding to oil and hazardous substance spills on the navigable waters within the U.S. coastal zone.

Based on the circumstances of the report and anticipated magnitude of the incident, the captain of the port will evaluate the situation and choose appropriate response options, including:

- notifying the state;
- contacting the nearest USCG strike team;
- engaging local law enforcement;
- contacting the U.S. Army's civil support team for initial response, who would then likely engage the Army's Soldier and Biological Chemical Command and also assist the incident commander and other first responders;
- initiating the incident command system in accordance with national policy on incident management;
- contacting the Centers for Disease Control and Prevention;
- preparing for media inquiries.

Experience has demonstrated that responding to an incident aggressively by quickly activating assets and notifying stakeholders brings a more favorable response that highlights the Coast Guard's proactive role in responding to reports of dangerous situations.

Pulling back resources at a later date is always easier than trying to gradually increase the amount of resources available to respond.

Dumped Chemicals

Dumped chemical weapons include:

- Arsenic trichloride, which reacts with water to produce hydrochloric acid, an extremely corrosive chemical that can cause irreversible damage to exposed tissues.
- Hydrogen cyanide, which forms cyanide ion in solution, a chemical that halts mitochondrial respiration, causing suffocation. Cyanide is extremely potent; as little as 300 mg/m^3 can kill a human within 10 to 60 minutes.
- Lewisite is a vesicant (blistering agent) and lung irritant.
- Mustard gas is a vesicant. There are several varieties of mustard agents of differing chain lengths.
- Nerve gas functions by inhibiting the action of acetylcholinesterase, an enzyme present in the neuromuscular junction, resulting in continual muscle stimulation and rigid paralysis. Some nerve agents include VX, soman, tabun, and sarin.
- Phosgene, like arsenic trichloride, can react with water to produce hydrochloric acid.
- White phosphorus is a form of elemental phosphorus. It is an extremely effective smoke-producing agent, and it is legally produced for this use even today. However, exposure to the body results in deep burn wounds; the burning cannot be extinguished without complete removal of oxygen.

WMDs close to home

Key to chemicals

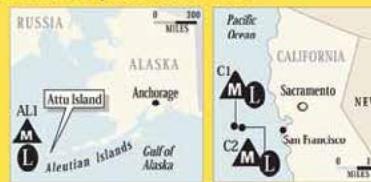
- Arsenic trichloride AT
- Hydrogen cyanide HC
- Lewisite L
- Mustard gas M
- Nerve gas NG
- Phosgene P
- White phosphorus WP

Known dumpsites in the Pacific

Munitions were dumped throughout at least 26 disposal sites off 11 states, between 60 to 100 miles offshore. The documentation rarely provides the precise locations of these sites, or the exact identity of what was dumped in each. Although the documents date back to World War II, this practice began in World War I; any disposals that were made prior to 1944 are undocumented. Reprinted with permission from the Daily Press Media Group.

Source: U.S. Army reports

Known dumpsites in the Pacific



Source: U.S. Army reports

Ocular exposure also typically occurred through exposure to mustard gas vapor. Damage to the cornea can result in permanent blindness. In all cases, the severity of injury is dose-dependent.

Mustard Gas Treatment

In most cases, even today, lack of immediate pain associated with exposure often results in increased exposure time, increasing the long-term severity of the injury. Additionally, victims of low-dose mustard gas exposure may not show symptoms for up to 24 hours.

If you are knowingly exposed, immediately remove contaminated clothing and rub the skin with dirt, powder, or other absorbent materials to remove any chemical that has not yet penetrated. The impact of mustard gas on tissue is almost immediate—one has only one to two minutes after exposure before nothing can be done to remove the mustard. Following the noted decontamination tasks, seek immediate medical care.

Fluid-filled blister on a fisherman who was accidentally exposed to sulfur mustard after handling discarded WWI munitions trawled from the sea bed off the coast of New England.¹



Moreover, the location involved in a release of mustard gas, whether on a vessel or ashore, is a "hot zone." Immediately notify the U.S. Coast Guard and local first responders for direct assistance.

First responders are also at risk for exposure and must be trained to use the correct personal protective equipment to enter the affected area. Use high-level protection to prevent respiratory, skin, and ocular exposure, including a full face piece, self-contained breathing apparatus, encapsulated chemical/vapor suits, and butyl rubber chemical-resistant gloves.





The 3 Rs

The U.S. Army is the authority on incidents involving munitions and works closely with the U.S. Coast Guard when unexploded ordnance munitions (UXO) are located in the maritime environment. For your own safety, follow the "3Rs" of explosive safety—recognize, retreat, and report.

Recognize

Any mariner must "recognize" or be suspicious when encountering a weapon or munitions container loaded with an unknown substance. It is not always easy to identify munitions, so, when in doubt, always treat the object as a serious threat to life and health.

Retreat

Due to the potential danger associated with a UXO or chemical warfare agent, immediately and carefully "retreat" away from any suspected weapon or munitions container. This may include returning the object to the water or securing the item and keeping the crew away. Do not touch, move, or disturb the object. Instead, depart the vicinity and mark the general area where it is located.

Report

At your first available opportunity, "report" the situation. Immediately notify the U.S. Coast Guard via VHF Channel 16, or contact the National Response Center at (800) 424-8802. You must also notify the state and local emergency operations centers of the incident as well, which can be suitably accomplished by dialing 911.



Maryland University College. 1/c Samantha Cardoza and 1/c Joshua Moan are cadets majoring in Marine Environmental Science at the U.S. Coast Guard Academy. All three work in Prof. Joshua Gray's laboratory.

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Endnote:

¹ Reprinted with permission from Annals of Emergency Medicine, Volume 59, Issue 1, Kathryn Weibrech, Sean Rhyee, Mary Elise Manuell, Craig Longo, Edward W. Boyer, and Eric Brush, "Sulfur Mustard Exposure Presenting to a Community Emergency Department."

For more information about sulfur mustard, contact:

Regional poison control center
(800) 222-1222

Centers for Disease Control and Prevention
Public Response Hotline
(800) CDC-INFO
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Email enquiries: cdcinfo@cdc.gov

Visit online at: www.bt.cdc.gov/agent/sulfurmustard/basics/facts.asp.

For more information:

Additional Resources

The U.S. Army, along with the Borden Institute, produced a textbook, "Medical Aspects of Chemical Warfare," which provides a detailed review of vesicants and many other chemical weapons. This book is available online, together with its sister book, "Medical Aspects of Biological Warfare."

A 1987 report, "Chemical Weapons Movement History Compilation," details the history of chemical weapons movement and disposal by the U.S. Army following World War II. A later report from 1989, "Summary of Some Chemical Munitions Sea Dumps by the United States," further summarizes these dump sites. A third report, published in 2001, "Off-shore Disposal of chemical Agents and Weapons Conducted by the United States" is another good resource.

Frank Swain's narrative blog details several incidents in Delaware. Available at:

[http://scienceblogs.com/sciencepunk/
2012/09/17/the-deadliest-catch/](http://scienceblogs.com/sciencepunk/2012/09/17/the-deadliest-catch/).



Nautical Engineering Queries

Prepared by NMC Engineering
Examination Team

Q
uestions

1. If a single-phase capacitor start induction motor fails to start, but instead hums without starting, what is most likely to be the problem?
 - A. an open start capacitor
 - B. a tripped circuit breaker
 - C. a shorted centrifugal switch
 - D. a blown fuse

2. When using a micrometer to measure a drill for size, you should measure across the drill _____.
 - A. margins
 - B. flutes
 - C. shank
 - D. web

3. If an analysis of a sample of used engine lube oil shows a high concentration of sodium nitrite, this probably indicates that _____.
 - A. the air filtration is inadequate
 - B. engine coolant is leaking into the lube oil
 - C. fuel oil is leaking into the lube oil
 - D. the piston rings are excessively worn

4. Which of the following statements holds true for both carbon dioxide and Halon 1301 fixed extinguishing systems?
 - A. A cylinder is considered satisfactory if its weight is within 10% of the stamped full weight of the charge.
 - B. If a protected space is ventilated mechanically, the ventilation system must be automatically shut down by the release of the agent.
 - C. To avoid confusion during an emergency situation, there should be only one action necessary (such as a single pull box) to activate the system.
 - D. All of the above.

1. Note: A single-phase capacitor start induction motor has two sets of windings shifted by 90 mechanical degrees: a run (main) winding and a start (auxiliary) winding. On an attempted startup, if the motor hums without starting, usually one of these two winding circuits is open-circuited. The humming noise is the result of current passing through one winding and not the other.

- an open start capacitor. **Correct answer.** A start capacitor is wired in series with the centrifugal switch and the start winding. If the capacitor has failed open, the start winding circuit has a permanent open-circuit condition, thus producing motor hum with no starting torque. The motor will fail to start.
- a tripped circuit breaker. Incorrect answer. If the circuit breaker is tripped, neither winding will pass current. On a start-up attempt, the motor will not start, nor will a humming noise be produced.
- a shorted centrifugal switch. Incorrect answer. The centrifugal switch is wired in series with the start capacitor and the start winding. If the centrifugal switch has failed shorted closed, the motor will successfully start but will trip the circuit breaker on excessive current shortly after startup because, the centrifugal switch is incapable of dropping out the start winding circuit as the motor accelerates up to rated speed.
- a blown fuse. Incorrect answer. This scenario is similar to a tripped circuit breaker. If a supply fuse is blown, neither winding will pass current. On a start-up attempt, the motor will not start, nor will a humming noise be produced.

2. Note: When the drill size marking has been worn off the drill shank, a micrometer may be used to measure the drill.

- margins. **Correct answer.** You should measure from the outside of one margin to outside of the other margin at the point of the drill (not be confused with the dead center). This corresponds to the actual drill size.
- flutes. Incorrect answer. The flutes are the spaces between the webs.
- shank. Incorrect answer. On a straight shank drill, the shank diameter is slightly less than the actual drill size (margin-to-margin diameter).
- web. Incorrect answer. The webs are the metal columns between the flutes. The web diameter is slightly less than the margin-to-margin diameter, thus providing the body clearance necessary for drilling.

3. Note: Lube oil analysis is a powerful diagnostic tool used to determine the following: condition of the lube oil and whether or not it should be replaced, type and level of contamination present, and the condition of the components of the machine being lubricated.

- the air filtration is inadequate. Incorrect answer. Inadequate air filtration will allow excessive amounts of dust and dirt to contaminate engine lubricating oil, resulting in a high silicon content.
- engine coolant is leaking into the lube oil. **Correct answer.** Sodium nitrite is a corrosion inhibitor found in many closed-loop cooling water systems. As such, the presence of this chemical in a lube oil analysis indicates engine coolant is leaking into the lube oil.
- fuel oil is leaking into the lube oil. Incorrect answer. Fuel oil leaking into the lube oil would result in "fuel dilution" of lube oil. Depending on the type of fuel, this would be indicated by a change in viscosity and flash point of the lube oil.
- the piston rings are excessively worn. Incorrect answer. Excessively worn piston rings results in cylinder blow-by, allowing the by-products of combustion to enter the lubricating oil.

4. Note: Carbon dioxide extinguishes fires mainly by smothering. Halon 1301 is a gaseous "Clean Agent" that extinguishes fires by chemically disrupting combustion.

- A cylinder is considered satisfactory if its weight is within 10% of the stamped full weight of the charge. Incorrect answer. While this is true for carbon dioxide extinguishing systems, the criteria for Halon 1301 is within 5% of the stamped full weight of the charge. Refer to 46 CFR Table 91.25-20(a)(2).
- If a protected space is ventilated mechanically, the ventilation system must be automatically shut down by the release of the agent. **Correct answer.** For a carbon dioxide extinguishing system, 46 CFR 95.15-35(a) states the following: "Where mechanical ventilation is provided for spaces other than cargo and similar spaces which are protected by a carbon dioxide extinguishing system, provisions shall be made so that the ventilation system is automatically shut down with the operation of the system to that space." For a fixed clean agent extinguishing system, 46 CFR 95.16-30(a) states the following: "If mechanical ventilation is provided for in a protected space, the ventilation system must automatically shut down prior to discharge of the system to that space."
- To avoid confusion during an emergency situation, there should be only one action necessary (such as a single pull box) to activate the system. Incorrect answer. Activating a carbon dioxide and Halon 1301 fixed extinguishing system requires two independent actions. Refer to 46 CFR 95.15-10(d) for carbon dioxide systems and 46 CFR 95.16-5(c) for "Clean Agent" systems.
- All of the above. Incorrect answer. Choice "B" is the only correct answer.

Nautical Deck Queries

Prepared by NMC Deck
Examination Team

Q
uestions

- 1. Both International and Inland: Which vessel must show an after masthead light, if over 50 meters in length?**
 - A. A vessel engaged in fishing
 - B. A vessel at anchor
 - C. A vessel not under command
 - D. A vessel trawling

- 2. What provides little or no indication that a vessel is dragging anchor?**
 - A. Changing range to an object abeam
 - B. Drift lead with the line tending forward
 - C. The cable alternates between slack and heavy tension
 - D. Changing bearing to a fixed distant object abeam

- 3. Spring tides are a semi-monthly event. Which of the following choices depicts the required circumstances for spring tides to occur?**
 - A. at the start of spring, when the sun is nearly over the equator
 - B. only when the sun and moon are on the same side of the Earth and nearly in line
 - C. when the sun and moon are at approximately 90° to each other as seen from the Earth
 - D. when the sun, moon, and Earth are nearly in line, in any order

- 4. Your vessel measures 125 feet long by 17 feet in beam. If the natural rolling period at a draft of 7'-09" is 6 seconds, what is the GM?**
 - A. 0.95 foot
 - B. 1.25 feet
 - C. 1.55 feet
 - D. 1.78 feet

1. A. A vessel engaged in fishing Incorrect answer.
 B. A vessel at anchor Incorrect answer.
 C. A vessel not under command Incorrect answer.
 D. A vessel trawling **Correct answer.** Reference: International and Inland Rule 26. Rule 26(b) states “- *A vessel when engaged in trawling, by which is meant the dragging through the water of a dredge net or other apparatus used as a fishing appliance, shall exhibit:*

- (i) *two all-round lights in a vertical line, the upper being green and the lower white, or a shape consisting of two cones with their apexes together in a vertical line one above the other;*
- (ii) *a masthead light abaft of and higher than the all-round green light; a vessel of less than 50 meters in length shall not be obliged to exhibit such a light but may do so;*
- (iii) *when making way through the water, in addition to the lights prescribed in this paragraph, side-lights and a sternlight.”*

2. A. Changing range to an object abeam **Correct answer.** Reference: *Knights Modern Seamanship*, Seventeenth Edition, Page 285.
 Ranges will vary as the vessel swings, falsely indicating that the anchor is dragging.
 B. Drift lead with the line tending forward Incorrect answer.
 C. The cable alternates between slack and heavy tension Incorrect answer.
 D. Changing bearing to a fixed distant object abeam Incorrect answer.

3. A. at the start of spring, when the sun is nearly over the equator Incorrect answer.
 B. only when the sun and moon are on the same side of the Earth and nearly in line Incorrect answer.
 C. when the sun and moon are at approximately 90° to each other as seen from the Earth Incorrect answer.
 D. when the sun, moon, and Earth are nearly in line, in any order **Correct answer.** Reference: *The American Practical Navigator*, 2002 Edition, Page 134.
 This phenomenon causes a combined lunar-solar effect increasing the range of tide by producing higher high water and lower low water cycles.

4. A. 0.95 foot Incorrect answer.
 B. 1.25 feet Incorrect answer.
 C. 1.55 feet **Correct answer.** Reference: *Stability and Trim for the Ship's Officer*, William E. George, Fourth Edition, Page 89.
 The following formula can be utilized to determine the vessel's metacentric height:

$$GM = (.44 \times \text{Beam in feet}/\text{rolling period in seconds})^2$$

$$GM = (.44 \times 17'/6\text{sec})^2$$

$$GM = 1.55 \text{ feet}$$

 D. 1.78 feet Incorrect answer.

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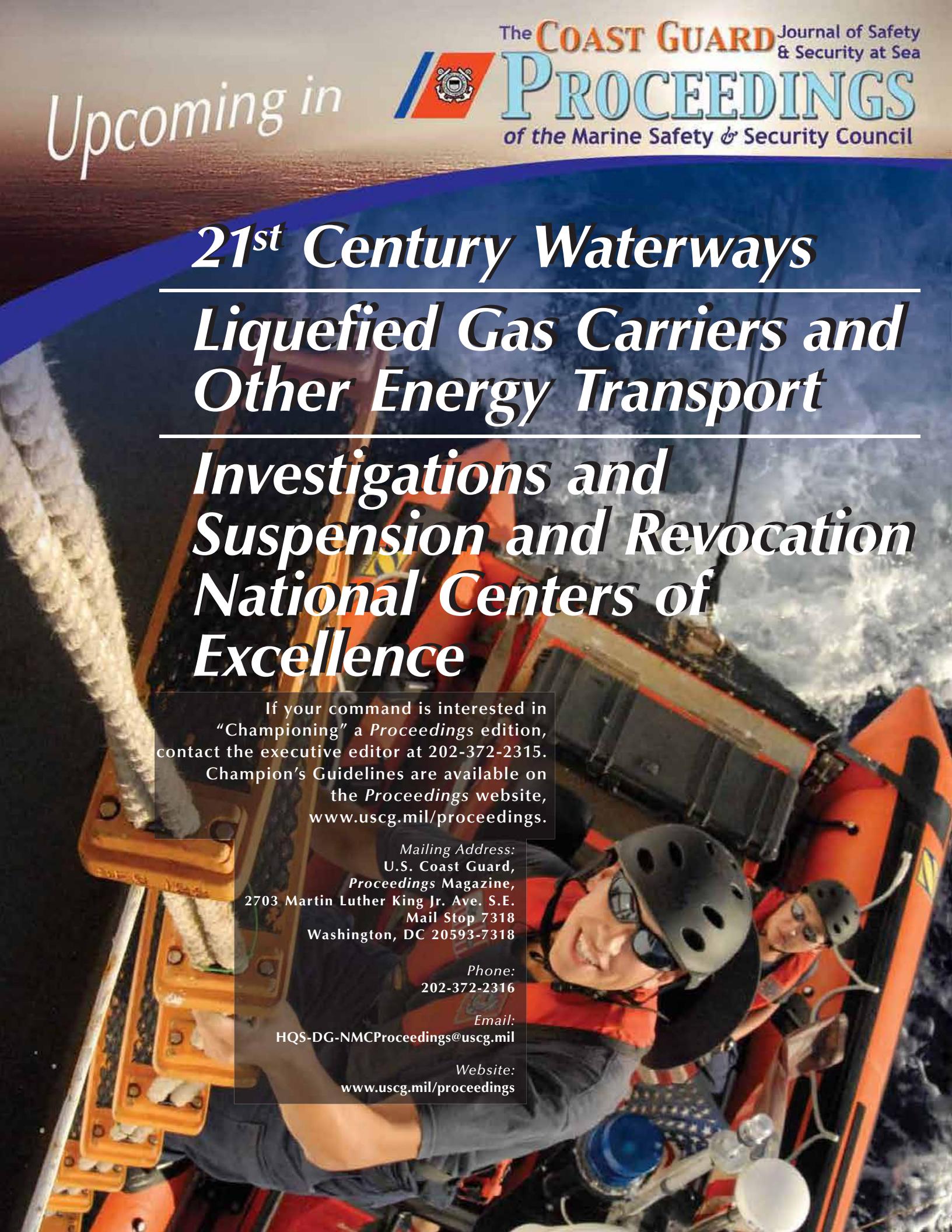
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